2003 STEERING

Steering Wheel & Column - Blazer, S10, Jimmy & Sonoma

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Horn Contact Plate Screws	5.5 N·m	50 ft in
Linear Shift Assembly to Steering Column Mounting Screws	10 N·m	89 ft in
Ignition Lock Cylinder Case Screws	7 N·m	62 lb in
Intermediate Shaft to the Steering Gear Pincht Bolt	35 N·m	25 lb ft
Steering Column Trim Cover Screws Lower to Support	3.5 N·m	31 lb in
Steering Column Trim Cover Screws Lower to Tilt Head	3.5 N·m	31 lb in
Turn Signal Multifunction Switch Screws Side	7 N·m	62 lb in
Turn Signal Multifunction Switch Screws Top	3 N·m	30 lb in
Shift Lever Screw	22 N·m	16 lb ft
Steering Column Bulkhead Connector Screw	6 N·m	53 lb in
Steering Column Support Screws	17 N·m	13 lb ft
Steering Column Toe Plate Nuts	30 N·m	22 lb ft
Column Support Bracket Nuts Upper	30 N·m	22 lb ft
Steering Wheel Nut	41 N·m	30 lb ft
Intermediate Shaft to the Steering Column Pinch Bolt	47 N·m	35 lb ft
Steering Column Trim Cover Screws Upper	1.5 N·m	13 lb in

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Fig. 1: Fastener Tightening Specifications
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SCHEMATIC AND ROUTING DIAGRAMS

COLUMN/IGNITION LOCK SCHEMATICS

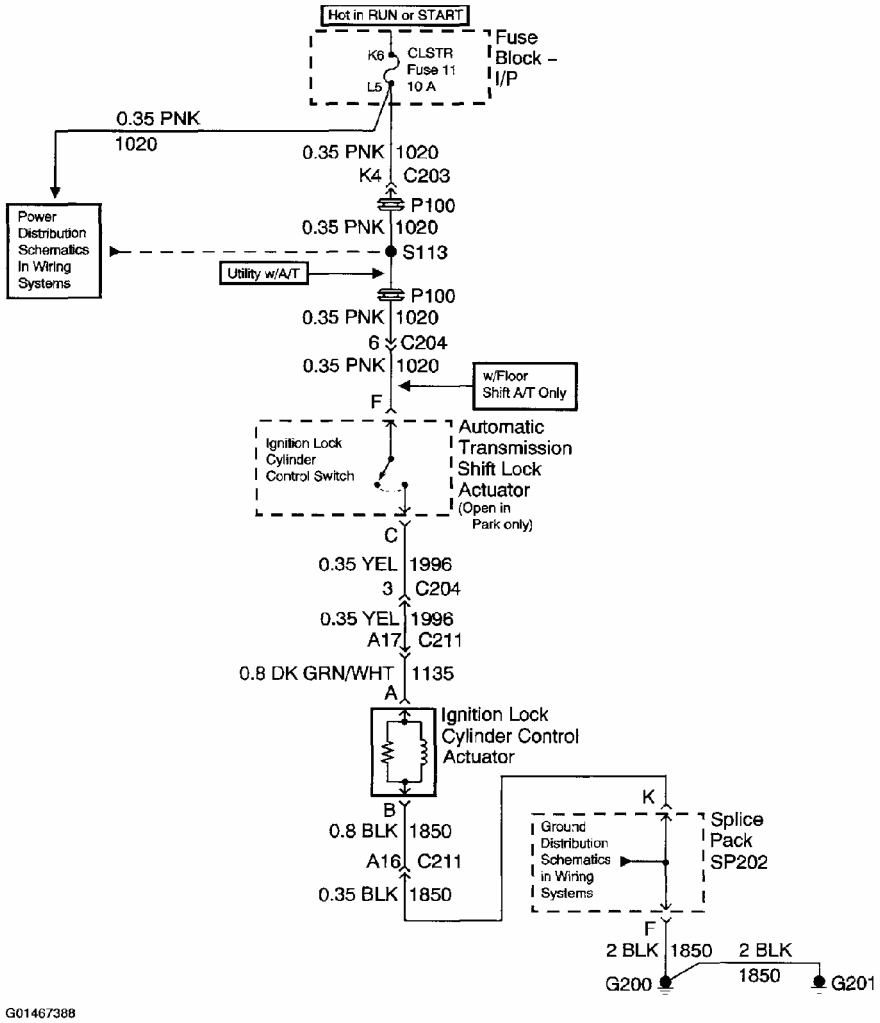
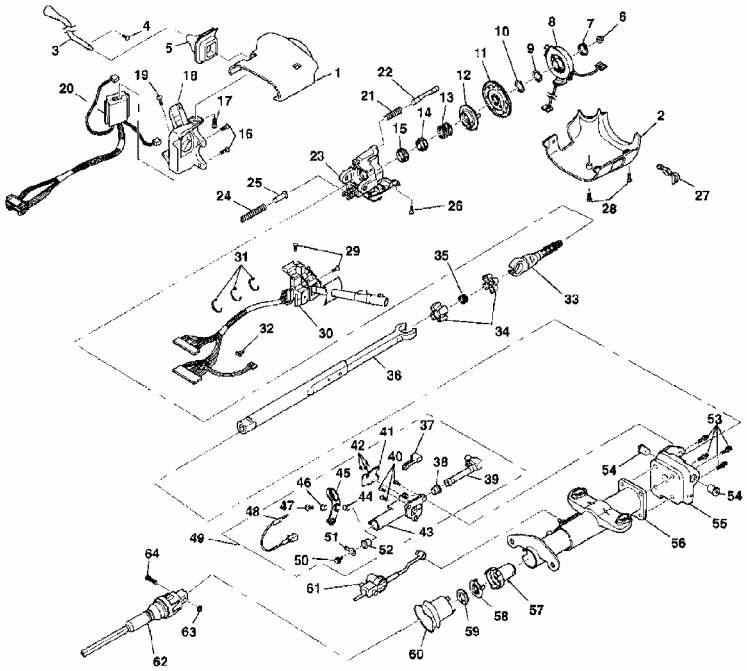


Fig. 2: Column/Ignition Lock Schematics
Courtesy of GENERAL MOTORS CORP.

COMPONENT LOCATOR

STEERING COLUMN DISASSEMBLED VIEW (COLUMN SHIFT AND FLOOR SHIFT TILT)



(1) Upper Trim Cover
(2) Lower Trim Cover
(3) Shift Lever Assembly
(4) Shift Lever Screw
(5) Shift Lever Seal
(6) Flanged Prevailing Torque Nut
(7) Retaining Ring
(8) SIR Coil
(9) Wave Washer
(10) Bearing Retainer
(11) Shaft Lock Shield Assembly
(12) Turn Signal Cancel Cam Assembly
(13) Upper Bearing Spring
(14) Upper Bearing Inner Race Seat
(15) Inner Race
(16) Pan Head Tapping Screws
(17) TORX® Head Screw
(18) Ignition Lock Cylinder Case
(19) Pan Head Tapping Screw
(20) Ignition Switch Assembly
(21) Lock Bolt Spring
(22) Lock Bolt Assembly
(23) Steering Column Tilt Head Assembly
(24) Tilt Spring
(25) Spring Guide
(26) TORX® Head Screw
(27) Tilt Lever Assembly
(28) Pan Head Tapping Screws
(29) Pan Head Tapping Screws
(30) Turn Signal and Multifunction Switch Assembly
(31) Wire Harness Straps
(32) Axial Position Assurance Connector
(33) Race and Upper Shaft Assembly
(34) Centering Sphere
(35) Joint Preload Spring
(36) Lower Steering Shaft Assembly
(37) Shift Lever Clevis
(38) Cam Bushing
(39) Linear Shift Shaft Assembly
(40) Flat Head Tapping Screws
(41) Shift Lever Gate
(42) Oval Head 6-Lobed Socket Tapping Screws
(43) Gear Shift Lever Support Bracket
(44) Actuator Bushing
(45) Cable Shift Cam Assembly
(46) Actuator Bushing
(47) Hexagon Flange Head Bolt
(48) Park Lock Cable Assembly
(49) Linear Shift Assembly
(50) Hexagon Flange Head Bolt
(51) Ball and Actuator Assembly
(52) Actuator Bushing
(53) TORX® Head Screws
(54) Pivot Pins
(55) Steering Column Support Assembly
(56) Steering Column Jacket Assembly
(57) Adapter and Bearing Assembly
(58) Shaft Seal Retainer
(59) Steering Shaft Seal
(60) Inner Boot Seal
(61) Automatic Transmission Shift Lock Cont
(62) Coupling and Steering Shaft Assembly
(63) Large Flange Hexagon Nut
(64) Round Head Locking Bolt

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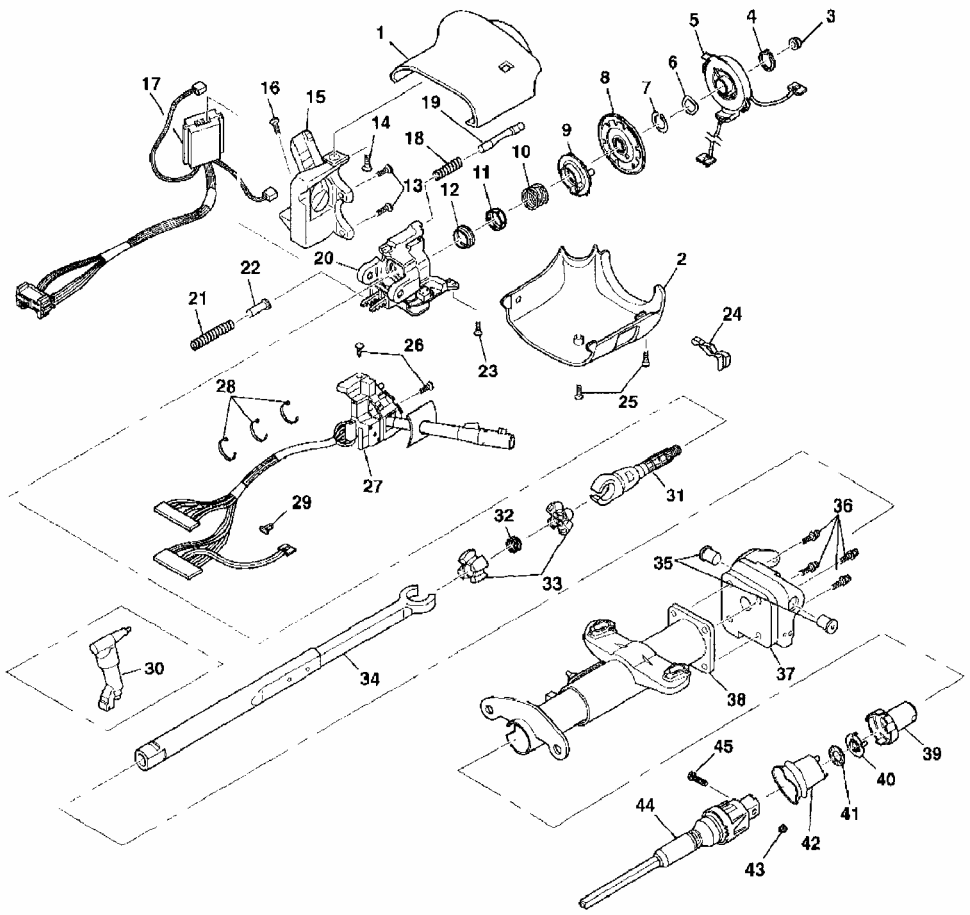
Fig. 3: Tilt Steering Column, Disassembled View
Courtesy of GENERAL MOTORS CORP.



(1) Upper Trim Cover
(2) Lower Trim Cover
(3) Flanged Prevailing Torque Nut
(4) Retaining Ring
(5) SIR Coil
(6) Wave Washer
(7) Bearing Retainer
(8) Shaft Lock Shield Assembly
(9) Turn Signal Cancel Cam Assembly
(10) Upper Bearing Spring
(11) Upper Bearing Inner Race Seat
(12) Inner Race
(13) Pan Head Tapping Screws
(14) TORX® Head Screw
(15) Ignition Lock Cylinder Case
(16) Pan Head Tapping Screw
(17) Ignition Switch Assembly
(18) Lock Bolt Spring
(19) Lock Bolt Assembly
(20) Steering Column Tilt Head Assembly
(21) Tilt Spring
(22) Spring Guide
(23) TORX® Head Screw
(24) Tilt Lever Assembly
(25) Pan Head Tapping Screws
(26) Pan Head Tapping Screws
(27) Turn Signal and Multifunction Switch Assembly
(28) Wire Harness Straps
(29) Axial Position Assurance Connector
(30) Steering Column Electric Park Lock
(31) Race and Upper Shaft Assembly
(32) Joint Preload Spring
(33) Centering Spheres
(34) Lower Steering Shaft Assembly
(35) Pivot Pins
(36) TORX® Head Screws
(37) Steering Column Support Assembly
(38) Steering Column Jacket Assembly
(39) Adapter and Bearing Assembly
(40) Sensor Retainer
(41) Shaft Seal Retainer
(42) Steering Shaft Boot
(43) Large Flange Hexagon Nut
(44) Coupling and Steering Shaft Assembly
(45) Round Head Locking Bolt

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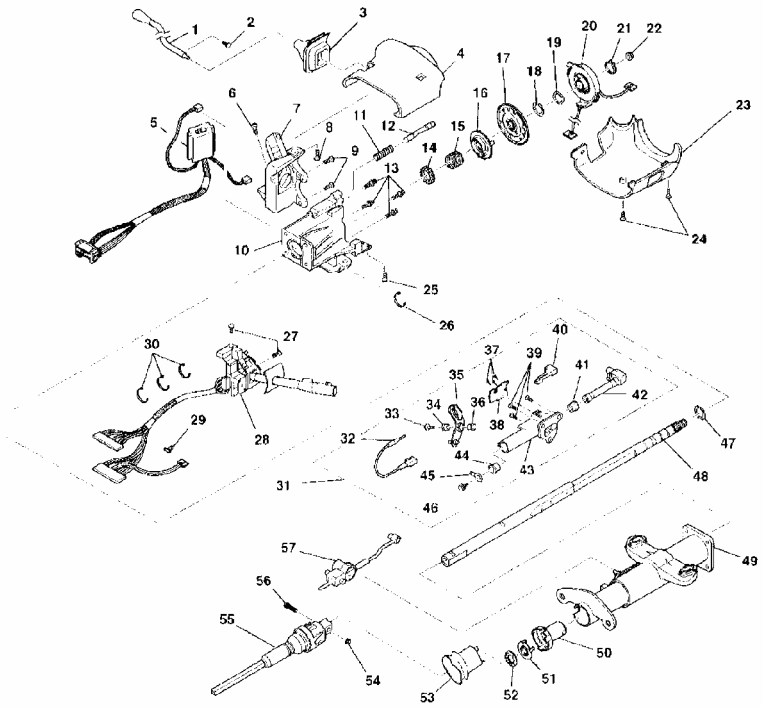
Fig. 4: Floor Shift, Tilt Steering Column

Courtesy of GENERAL MOTORS CORP.

STEERING COLUMN DISASSEMBLED VIEW (COLUMN SHIFT AND FLOOR SHIFT STANDARD)



(1) Shift Lever Assembly
(2) Shift Lever Screw
(3) Shift Lever Seal
(4) Upper Trim Cover
(5) Ignition Switch Assembly
(6) Pan Head Tapping Screw
(7) Ignition Lock Cylinder Case
(8) TORX® Head Screw
(9) Pan Head Tapping Screws
(10) Steering Column Housing Assembly
(11) Lock Bolt Spring
(23) Lower Trim Cover
(24) Pan Head Tapping Screws
(25) TORX® Head Screw
(26) Wire Harness Strap
(27) Pan Head Tapping Screws
(28) Turn Signal and Multifunction Switch Assembly
(29) Axial Position Assurance Connector
(30) Wire Harness Straps
(31) Linear Shift Assembly
(32) Park Lock Cable Assembly
(33) Hexagonal Flange Head Bolt
(34) Cam Bushing
(35) Cable Shift Cam Assembly
(36) Cam Bushing
(37) Oval Head 6–Lobed Socket Tapping Screws
(38) Shift Lever Gate
(39) Flat Head Tapping Screws
(40) Park Position Switch Assembly
(12) Lock Bolt Assembly
(13) TORX® Head Screws
(14) Thrust Washer
(15) Upper Bearing Spring
(16) Turn Signal Cancel Cam Assembly
(17) Shaft Lock Shield Assembly
(18) Bearing Retainer
(19) Wave Washer
(20) SIR Coil
(21) Retaining Ring
(22) Flanged Prevailing Torque Nut
(41) Actuator Bushing
(42) Shift Lever Clevis
(43) Gear Shift Lever Assembly Support Bra Assembly
(44) Actuator Bushing
(45) Ball and Actuator Assembly
(46) Hex Flange Head Bolt
(47) Retaining Ring
(48) Steering Shaft Assembly
(49) Steering Column Jacket Assembly
(50) Adapter and Bearing Assembly
(51) Shaft Seal Retainer
(52) Steering Shaft Seal
(53) Inner Boot Seal
(54) Large Flange Hexagon Nut
(55) Coupling and Steering Shaft Assembly
(56) Round Head Locking Bolt
(57) Electrical (BTSI) Actuator

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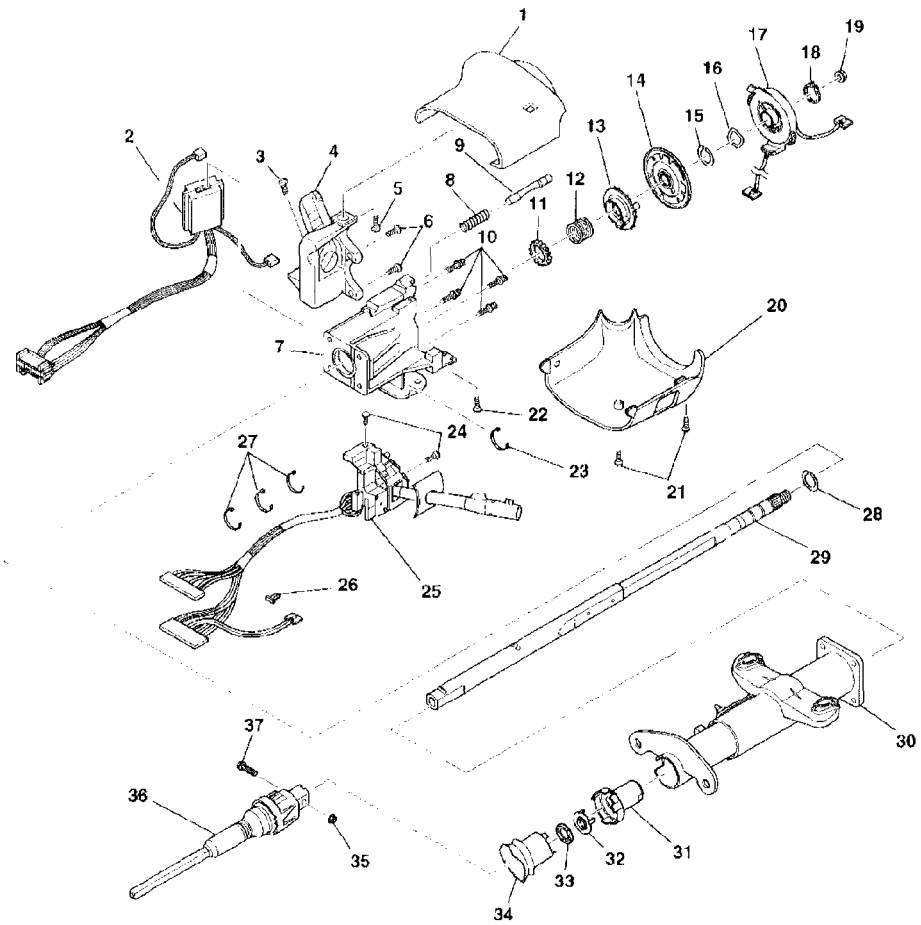
Fig. 5: Standard Column Shift
Courtesy of GENERAL MOTORS CORP.



(1) Upper Trim Cover
(2) Ignition Switch Assembly
(3) Pan Head Tapping Screw
(4) Ignition Lock Cylinder Case
(5) Pan Head Head Screw
(6) Pan Head Tapping Screws
(7) Steering Column Housing Assembly
(8) Lock Bolt Spring
(9) Lock Bolt Assembly
(10) TORX® Head Screws
(11) Thrust Washer
(12) Upper Bearing Spring
(13) Turn Signal Cancel Cam Assembly
(14) Shaft Lock Shield Assembly
(15) Bearing Retainer
(16) Wave Washer
(17) SIR Coil
(18) Retaining Ring
(19) Flanged Prevailing Torque Nut
(20) Lower Trim Cover
(21) Pan Head Tapping Screws
(22) TORX® Head Screw
(23) Wire Harness Strap
(24) Pan Head Tapping Screws
(25) Turn Signal and Multifunction Switch Assembly
(26) Axial Position Assurance Connector
(27) Wire Harness Straps
(28) Bearing Retainer
(29) Steering Shaft Assembly
(30) Steering Column Jacket Assembly
(31) Adapter and Bearing Assembly
(32) Shaft Seal Retainer
(33) Steering Shaft Seal
(34) Inner Boot Seal
(35) Large Flange Hexagon Nut
(36) Coupling and Steering Shaft Assembly
(37) Round Head Locking Bolt

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Fig. 6: Standard Floor Shift Column
Courtesy of GENERAL MOTORS CORP.

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - STEERING WHEEL AND COLUMN

Review the system description and operation in order to familiarize yourself with the system functions. Refer to **STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION** .

Visual/Physical Inspection

- Inspect for aftermarket devices which could affect the operation of the steering wheel and column.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause the symptom.

Symptoms List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- **LOCK SYSTEM DOES NOT UNLOCK**
- **LOCK SYSTEM DOES NOT LOCK**
- **LOCK SYSTEM STICKS IN START**
- **KEY CANNOT BE REMOVED IN THE OFF LOCK POSITION**
- **HIGH LOCK EFFORT**
- **NOISE IN STEERING COLUMN**
- **HIGH SHIFT EFFORT**
- **LOOSENESS IN STEERING COLUMN**
- **STEERING COLUMN TILT FUNCTION INOPERATIVE**

IGNITION CAN/CANNOT BE TURNED OFF WITH TRANSMISSION IN ANY GEAR

Step	Action	Yes	No
Schematic Reference: *Column/Ignition Lock Schematics*			
1	Did you review the ignition lock cylinder control actuator operation and perform the necessary inspections?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	1. Push the ignition lock cylinder control actuator release button which is on the underside of the ignition key cylinder. 2. Turn the key to the OFF position and remove the key. Were you able to turn the key to the OFF position and remove the key?	Go to *Step 3*	Go to *Lock System Does Not Lock*
3	Verify the fault is present. Does the system operate normally?	Go to *Testing for Intermittent and Poor Connections* in Wiring Systems	Go to *Step 4*
4	1. Turn OFF the ignition. 2. Disconnect the ignition lock cylinder control actuator. 3. Turn ON the ignition, with the engine OFF. 4. Connect a test lamp between the battery positive voltage and ground circuits of the ignition lock cylinder control actuator. 5. Cycle the gear shift from Park to Drive. Does the test lamp turn ON and OFF with each cycle?	Go to *Step 12*	Go to *Step 5*
5	Connect a test lamp between the ground circuit of the ignition lock cylinder control actuator and B+ voltage. Does the test lamp illuminate?	Go to *Step 6*	Go to *Step 8*
6	1. Turn OFF the ignition. 2. Reconnect the ignition lock cylinder control actuator. 3. Disconnect the floor shift control connector. 4. Turn ON the ignition, with the engine OFF. 5. Connect a test lamp between the battery positive voltage and ground circuits of the ignition lock cylinder control switch. Does the test lamp illuminate?	Go to *Step 11*	Go to *Step 7*

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Fig. 7: Ignition Can/Cannot Be Turned Off With Transmission In Any Gear (1 Of 2)
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Step	Action	Yes	No
7	Connect a test lamp between battery positive circuit of the ignition lock cylinder control switch and a good ground. Does the test lamp illuminate?	Go to *Step 10*	Go to *Step 9*
8	Repair the open in the ground circuit of the ignition lock cylinder control actuator circuit. Refer to *Wiring Repairs* in Wiring Systems. Did you complete the repair?	Go to *Step 15*	—
9	Repair the open or short to ground of the ignition lock cylinder control switch battery positive voltage circuit. Refer to *Wiring Repairs* in Wiring Systems. Did you complete the repair?	Go to *Step 15*	—
10	Repair the open, short to ground, or short to voltage of the ignition lock cylinder control switch signal circuit. Refer to *Wiring Repairs* in Wiring Systems. Did you complete the repair?	Go to *Step 15*	—
11	Inspect for poor connections at the ignition lock cylinder control switch. Refer to *Testing for Intermittent and Poor Connections* and *Connector Repairs* in Wiring Systems. Did you find and correct the condition?	Go to *Step 15*	Go to *Step 13*
12	Inspect for poor connections at the ignition lock cylinder control actuator. Refer to *Testing for Intermittent and Poor Connections* and *Connector Repairs* in Wiring Systems. Did you find and correct the condition?	Go to *Step 15*	Go to *Step 14*
13	Replace the ignition lock cylinder control switch. Refer to *Floor Shift Control Replacement* in Automatic Transmission - 4L60-E/4L65-E Did you complete the replacement?	Go to *Step 15*	—
14	Replace the ignition lock cylinder control actuator. Did you complete the replacement?	Go to *Step 15*	—
15	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 4*

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Fig. 8: Ignition Can/Cannot Be Turned Off With Transmission In Any Gear (2 Of 2) Courtesy of GENERAL MOTORS CORP.

LOCK SYSTEM DOES NOT UNLOCK

Step	Action	Yes	No
DEFINITION: The lock system does not allow the key to rotate out of the OFF position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the lock system does not unlock. Does the lock system operate normally?	System OK	Go to *Step 3*
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to *Step 7*	Go to *Step 4*
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to *Step 8*	Go to *Step 5*
5	Inspect the ignition lock cylinder case assembly for looseness. Is the ignition lock cylinder case assembly loose?	Go to *Step 9*	Go to *Step 6*
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to *Step 10*	Go to *Step 3*

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Fig. 9: Lock System Does Not Unlock (1 Of 2)

Courtesy of GENERAL MOTORS CORP.

Step	Action	Yes	No
7	Replace the key. Refer to *Key and Lock Cylinder Coding* in General Information. Did you complete the repair?	Go to *Step 11*	—
8	Replace the lock cylinder. Refer to *Ignition Lock Cylinder Replacement*. Did you complete the repair?	Go to *Step 11*	—
9	Tighten the ignition lock cylinder case assembly. Refer to *Fastener Tightening Specifications*. Did you complete the repair?	Go to *Step 11*	—
10	Replace the ignition switch. Refer to *Ignition Switch Replacement*. Did you complete the repair?	Go to *Step 11*	—
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 10: Lock System Does Not Unlock (2 Of 2)
Courtesy of GENERAL MOTORS CORP.

LOCK SYSTEM DOES NOT LOCK

Step	Action	Yes	No
DEFINITION: The lock system will not allow the key to be turned to the OFF lock position.			
1	Did you review the Steering Wheel and Column Description and Operation?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the lock system does not lock. Does the lock system operate normally?	System OK	Go to *Step 3*
3	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to *Step 7*	Go to *Step 4*
4	Inspect the shift cable adjustment. Is the shift cable adjusted incorrectly?	Go to *Step 8*	Go to *Step 5*
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to *Step 9*	Go to *Step 6*
6	Inspect the linear shift assembly for damage. Is the linear shift assembly damaged?	Go to *Step 10*	Go to *Step 3*
7	Replace the lock cylinder. Refer to *Ignition Lock Cylinder Replacement*. Did you complete the repair?	Go to *Step 11*	—
8	Adjust the shift cable. Refer to *Automatic Transmission Range Selector Cable Adjustment* in Automatic Transmission – 4L60-E/4L65-E. Did you complete the repair?	Go to *Step 11*	—
9	Replace the ignition switch. Refer to *Ignition Switch Replacement*. Did you complete the repair?	Go to *Step 11*	—
10	Replace the linear shift assembly. Refer to *Linear Shift Assembly Replacement*. Did you complete the repair?	Go to *Step 11*	—
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 11: Lock System Does Not Lock
Courtesy of GENERAL MOTORS CORP.

LOCK SYSTEM STICKS IN START

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the lock system sticks in the START position. Does the lock system operate normally?	System OK	Go to *Step 3*
3	Inspect the ignition lock cylinder case assembly for damage. Is the ignition lock cylinder case assembly damaged?	Go to *Step 6*	Go to *Step 4*
4	Inspect the lock cylinder for damage. Is the lock cylinder damaged?	Go to *Step 7*	Go to *Step 5*
5	Inspect the ignition switch for damage. Is the ignition switch damaged?	Go to *Step 8*	Go to *Step 3*
6	Replace the ignition lock cylinder case assembly. Refer to *Ignition Lock Cylinder Case Replacement (Floor Shift)* or *Ignition Lock Cylinder Case Replacement (Column Shift)*. Did you complete the repair?	Go to *Step 9*	—
7	Replace the lock cylinder. Refer to *Ignition Lock Cylinder Replacement*. Did you complete the repair?	Go to *Step 9*	—
8	Replace the ignition switch. Refer to *Ignition Switch Replacement*. Did you complete the repair?	Go to *Step 9*	—
9	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 12: Lock System Sticks In Start
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KEY CANNOT BE REMOVED IN THE OFF LOCK POSITION

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the key cannot be removed from the lock cylinder in the OFF position. Does the lock system operate normally?	System OK	Go to *Step 3*
3	Inspect for incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to *Step 5*	Go to *Step 4*
4	Inspect for a faulty lock cylinder or release button. Is the lock cylinder or release button damaged?	Go to *Step 6*	Go to *Step 3*
5	Replace the key. Refer to *Key and Lock Cylinder Coding* in General Information. Did you complete the repair?	Go to *Step 7*	—
6	Replace the lock cylinder. Refer to *Ignition Lock Cylinder Replacement*. Did you complete the repair?	Go to *Step 7*	—
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 13: Key Cannot Be Removed In Off Lock Position
Courtesy of GENERAL MOTORS CORP.

HIGH LOCK EFFORT

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the lock system has a high lock effort. Does the lock system operate normally?	System OK	Go to *Step 3*
3	Inspect for an incorrect, worn, or damaged key. Is the key incorrect, worn, or damaged?	Go to *Step 7*	Go to *Step 4*
4	Inspect for a faulty lock cylinder. Is the lock cylinder damaged?	Go to *Step 8*	Go to *Step 5*
5	Inspect the ignition lock cylinder case assembly for damage. Is the ignition lock cylinder case assembly damaged?	Go to *Step 9*	Go to *Step 6*
6	Inspect the ignition switch assembly for damage. Is the ignition switch assembly damaged?	Go to *Step 10*	Go to *Step 7*
7	Replace the key. Refer to *Key and Lock Cylinder Coding* in General Information. Did you complete the repair?	Go to *Step 11*	—
8	Replace the lock cylinder. Refer to *Ignition Lock Cylinder Replacement*. Did you complete the repair?	Go to *Step 11*	—
9	Replace the ignition lock cylinder case assembly. Refer to *Ignition Lock Cylinder Case Replacement (Floor Shift)* or *Ignition Lock Cylinder Case Replacement (Column Shift)*. Did you complete the repair?	Go to *Step 11*	—
10	Replace the ignition switch. Refer to *Ignition Switch Replacement*. Did you complete the repair?	Go to *Step 11*	—
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 14: High Lock Effort

Courtesy of GENERAL MOTORS CORP.

NOISE IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and perform the necessary inspections?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that noise is present in the steering column during operation. Is noise present in the steering column during operation?	Go to *Step 3*	System OK
3	Inspect the steering column components for looseness. Is the steering column components loose?	Go to *Step 10*	Go to *Step 4*
4	Inspect the SIR coil for noise. Is the SIR coil noisy?	Go to *Step 11*	Go to *Step 5*
5	Inspect the horn contact ring for lubrication. Is the horn contact ring lubricated?	Go to *Step 12*	Go to *Step 6*
6	Inspect the lock plate retaining ring for the correct installation. Is the lock plate retaining ring installed properly?	Go to *Step 13*	Go to *Step 7*
7	Inspect the shaft bearing for the following conditions: • Damage • Lubrication • Wear • Proper seating Are the bearings in need of repair or replacement?	Go to *Step 14*	Go to *Step 8*

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Fig. 15: Noise In Steering Column (1 Of 2)
Courtesy of GENERAL MOTORS CORP.

Step	Action	Yes	No
8	Inspect the spherical joint for lubrication. Is the spherical joint lubricated?	Go to *Step 15*	Go to *Step 9*
9	Inspect the steering column coupling for looseness. Is the steering column coupling loose?	Go to *Step 16*	Go to *Step 3*
10	Tighten the steering column components to specifications. Refer to *Fastener Tightening Specifications*. Did you complete the repair?	Go to *Step 17*	—
11	Replace the SIR coil. Refer to *Inflatable Restraint Steering Wheel Module Coil Replacement* in SIR. Did you complete the repair?	Go to *Step 17*	—
12	Lubricate the horn contact ring. Did you complete the repair?	Go to *Step 17*	—
13	Install the lock plate retaining ring properly. Did you complete the repair?	Go to *Step 17*	—
14	Repair the shaft bearings as necessary. Refer to *Lower Bearing and Steering Column Jacket Replacement (Column Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)*. Did you complete the repair?	Go to *Step 17*	—
15	Lubricate the spherical joints. Did you complete the repair?	Go to *Step 17*	—
16	Tighten the steering column coupling to specifications. Refer to *Fastener Tightening Specifications*. Did you complete the repair?	Go to *Step 17*	—
17	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 16: Noise In Steering Column (2 Of 2)
Courtesy of GENERAL MOTORS CORP.

HIGH SHIFT EFFORT

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that a high shift effort is required in order to shift out of the PARK position. Does the shifter operate normally?	System OK	Go to *Step 3*
3	Inspect for worn or damaged shift linkage components. Are the shift linkage components worn or damaged?	Go to *Step 5*	Go to *Step 4*
4	Inspect the shift cable for binding or misadjustment. Is the shift cable binding or misadjusted?	Go to *Step 6*	Go to *Step 3*
5	Replace the shift cable. Refer to *Automatic Transmission Range Selector Cable Replacement (Column Shift)* or *Automatic Transmission Range Selector Cable Replacement (Console Shift)* in Automatic Transmission – 4L60-E/4L65-E. Did you complete the repair?	Go to *Step 7*	—
6	Adjust the shift cable. Refer to *Automatic Transmission Range Selector Cable Adjustment* in Automatic Transmission – 4L60-E/4L65-E. Did you complete the repair?	Go to *Step 7*	—
7	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 17: High Shift Effort
Courtesy of GENERAL MOTORS CORP.

LOOSENESS IN STEERING COLUMN

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the steering column is loose. Is the steering column loose?	Go to *Step 3*	System OK
3	Inspect the steering column mounting brackets for looseness. Are the steering column mounting brackets loose?	Go to *Step 8*	Go to *Step 4*
4	Verify that the steering column bracket capsule is not sheared. Is the steering column bracket capsule sheared?	Go to *Step 9*	Go to *Step 5*
5	Inspect the support screws for looseness. Are the support screws loose?	Go to *Step 10*	Go to *Step 6*
6	Inspect the intermediate shaft for worn joints or looseness. Is the intermediate joint worn or loose?	Go to *Step 11*	Go to *Step 7*
7	Inspect the tilt head, support and pivot pins for looseness. Are there any loose components?	Go to *Step 12*	Go to *Step 2*
8	Tighten the brackets to specifications. Refer to *Fastener Tightening Specifications*. Did you complete the repair?	Go to *Step 13*	—
9	Replace the jacket assembly. Refer to *Lower Bearing and Steering Column Jacket Replacement (Column Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)*. Did you complete the replacement?	Go to *Step 13*	—
10	Tighten the support screws to specifications. Refer to *Fastener Tightening Specifications*. Did you complete the repair?	Go to *Step 13*	—
11	Tighten or replace the intermediate shaft as needed. Refer to *Intermediate Steering Shaft Replacement - Upper* and *Intermediate Steering Shaft Replacement - Lower*. Did you complete the repair?	Go to *Step 13*	—
12	Repair or replace the tilt head, support and pivot pins as necessary. Refer to *Lower Bearing and Steering Column Jacket Replacement (Column Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)*. Did you complete the replacement?	Go to *Step 13*	—
13	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 18: Looseness In Steering Column
Courtesy of GENERAL MOTORS CORP.

STEERING COLUMN TILT FUNCTION INOPERATIVE

Step	Action	Yes	No
1	Did you review the Steering Wheel and Column Description and Operation and perform the necessary inspections?	Go to *Step 2*	Go to *Steering Wheel and Column Description and Operation*
2	Verify that the steering column tilt function is inoperative. Does the steering column tilt function operate normally?	System OK	Go to *Step 3*
3	Verify that the shoe is not seized on the pivot pin. Is the shoe seized on the pivot pin?	Go to *Step 9*	Go to *Step 4*
4	Inspect the shoe grooves for dirt, burrs, or rust. Are the shoe grooves free of dirt, burrs, and rust?	Go to *Step 9*	Go to *Step 5*
5	Inspect weak or broken shoe lock spring. Is the shoe lock spring weak or broken?	Go to *Step 9*	Go to *Step 6*
6	Inspect the pivot pins for binding. Are the pivot pins binding?	Go to *Step 10*	Go to *Step 7*
7	Inspect for a weak or broken wheel tilt spring. Is the wheel tilt spring weak or broken?	Go to *Step 11*	Go to *Step 8*
8	Inspect the steering column wiring harness for tightness. Is the steering column wiring harness too tight?	Go to *Step 12*	Go to *Step 3*
9	Replace the tilt head. Refer to *Lower Bearing and Steering Column Jacket Replacement (Column Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)*. Is the repair complete?	Go to *Step 13*	—
10	Replace the pivot pins. Refer to *Lower Bearing and Steering Column Jacket Replacement (Column Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Tilt)* or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* or *Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)*. Is the repair complete?	Go to *Step 13*	—
11	Replace the tilt spring. Refer to *Tilt Spring Replacement*. Is the repair complete?	Go to *Step 13*	—
12	Reroute the steering column wiring harness to the correct location. Is the steering column wiring harness routed properly?	Go to *Step 13*	—
13	Operate the steering column tilt function in order to verify the repair. Did you correct the condition?	System OK	Go to *Step 3*

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Fig. 19: Steering Column Tilt Function Inoperative
Courtesy of GENERAL MOTORS CORP.

REPAIR INSTRUCTIONS

SEAL REPLACEMENT - INTERMEDIATE STEERING SHAFT

Removal Procedure

1. Remove the steering column. Refer to **STEERING COLUMN REPLACEMENT** .
2. Remove the intermediate shaft seal from the vehicle.

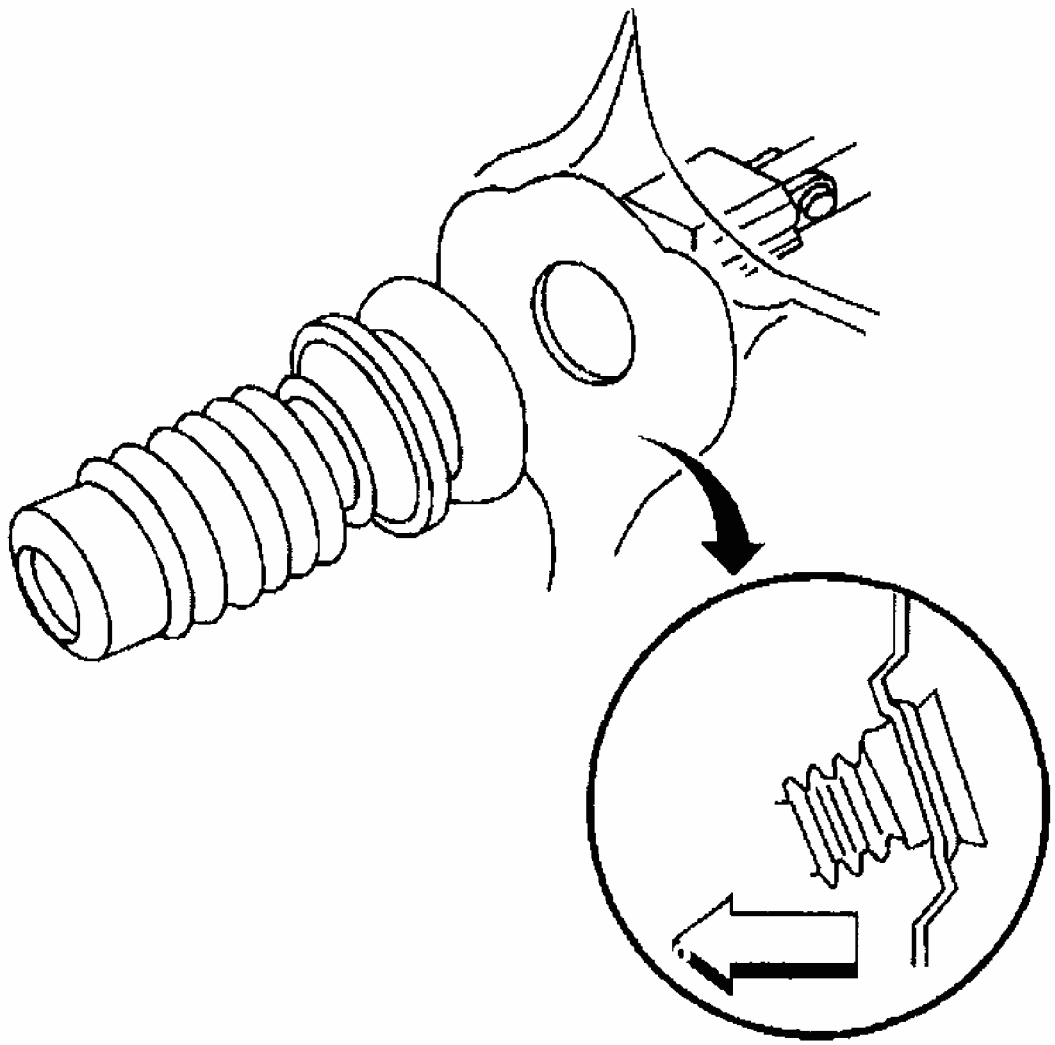

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Fig. 20: Removing Intermediate Shaft Seal From Vehicle
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the intermediate shaft seal to the vehicle.
2. Install the steering column. Refer to **STEERING COLUMN REPLACEMENT** .

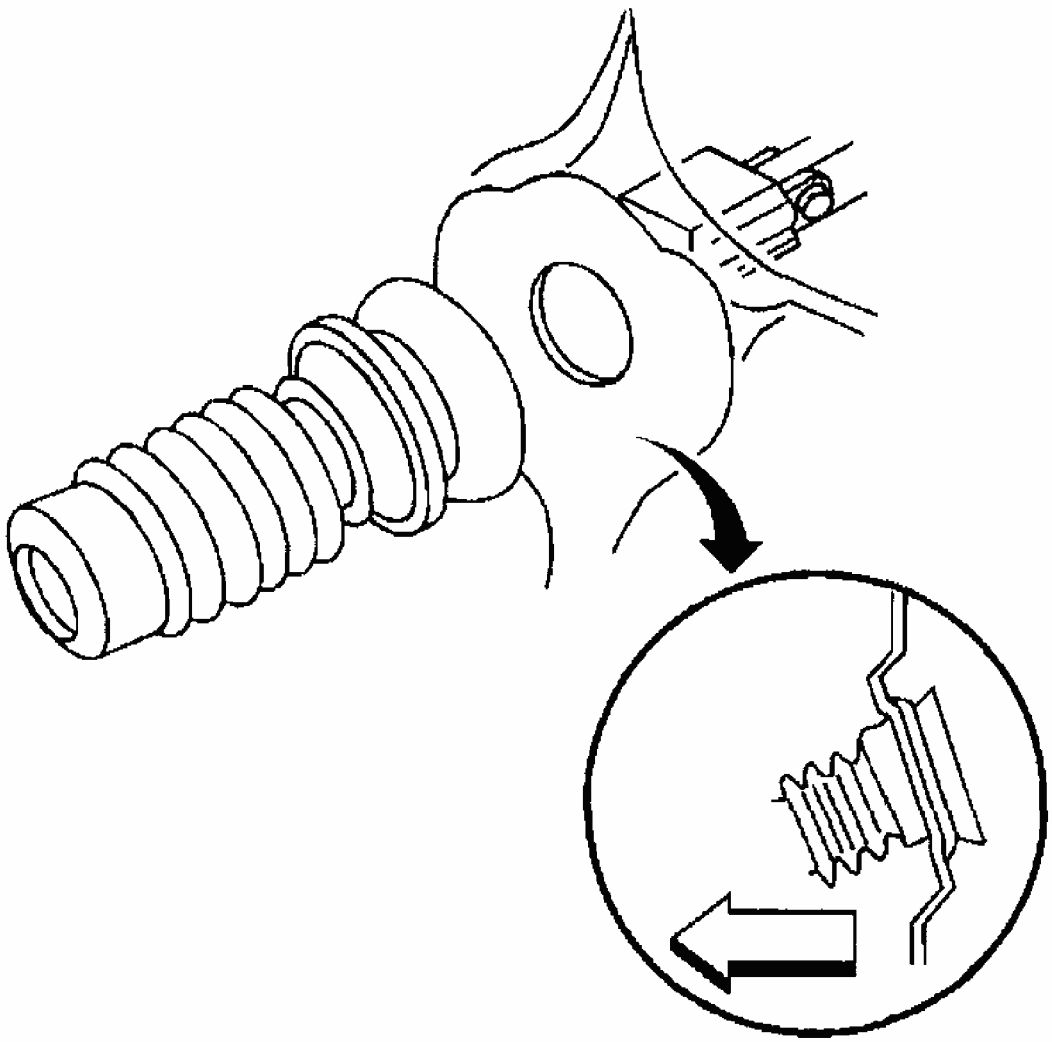

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Fig. 21: Installing Intermediate Shaft Seal To Vehicle
Courtesy of GENERAL MOTORS CORP.

INTERMEDIATE STEERING SHAFT REPLACEMENT - UPPER

Removal Procedure

1. Turn the steering wheel so that the front wheels are pointing straight ahead.
2. Turn the ignition switch to the LOCK position and remove the key.

Note the relationship of the upper intermediate shaft to the lower intermediate shaft and the upper intermediate shaft to the steering column in order to ensure proper installation.

3. Remove the steering column. Refer to **STEERING COLUMN REPLACEMENT** .
4. Remove the nut and the bolt that retain the upper intermediate shaft to the steering column.
5. Remove the upper intermediate shaft from the steering column.

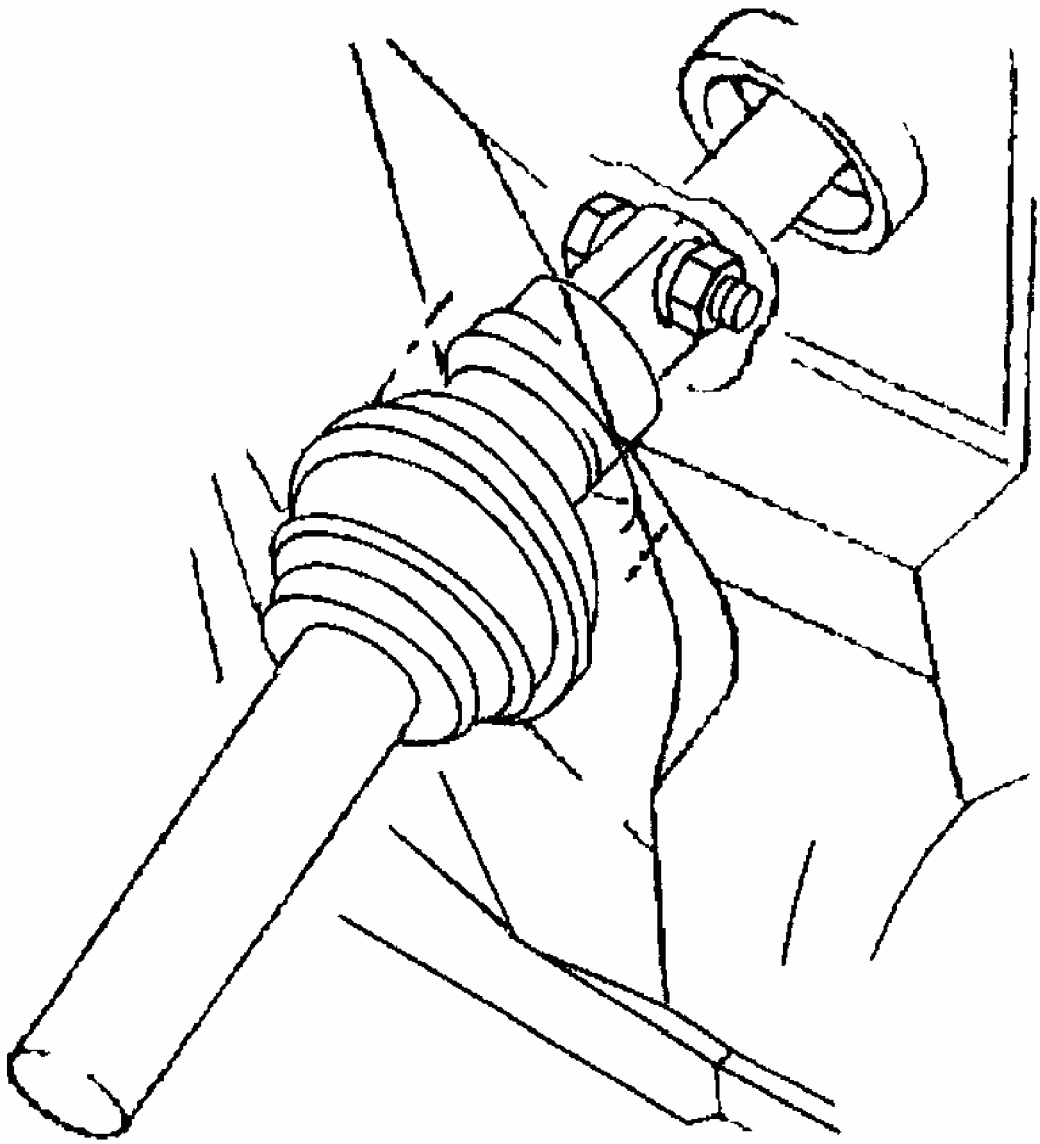

Fig. 22: Removing Upper Intermediate Shaft From Steering Column
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the upper intermediate shaft to the steering column.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the nut and the bolt that retain the upper intermediate shaft to the steering column.

Tighten

Tighten the nut to 47 N.m (35 lb ft).

3. Install the steering column. Refer to **STEERING COLUMN REPLACEMENT** .

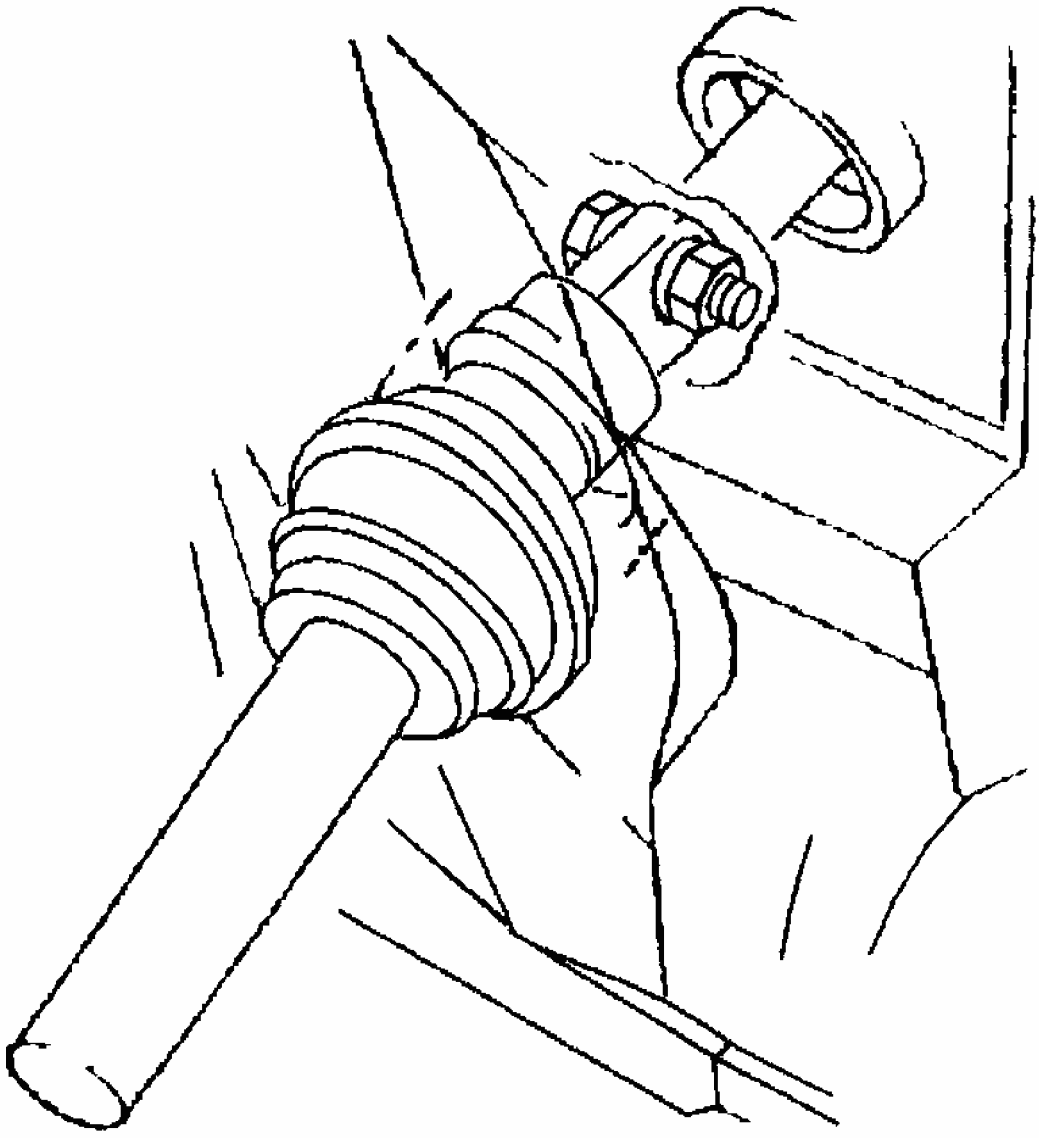

Fig. 23: Installing Upper Intermediate Shaft To Steering Column
Courtesy of GENERAL MOTORS CORP.

INTERMEDIATE STEERING SHAFT REPLACEMENT - LOWER

Tools Required

J 42640 Steering Column Anti-Rotation Pin

Removal Procedure

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Lock the steering column through the access hole in the lower steering column trim cover using *J 42640* .
2. Remove the air cleaner assembly. Refer to AIR CLEANER OUTLET RESONATOR REPLACEMENT in Engine Controls - 2.2L or AIR CLEANER ASSEMBLY REPLACEMENT in Engine Controls - 4.3L.

   Note the relationship of the lower intermediate shaft to the upper intermediate shaft and the lower intermediate shaft to the steering gear input shaft in order to ensure proper installation.

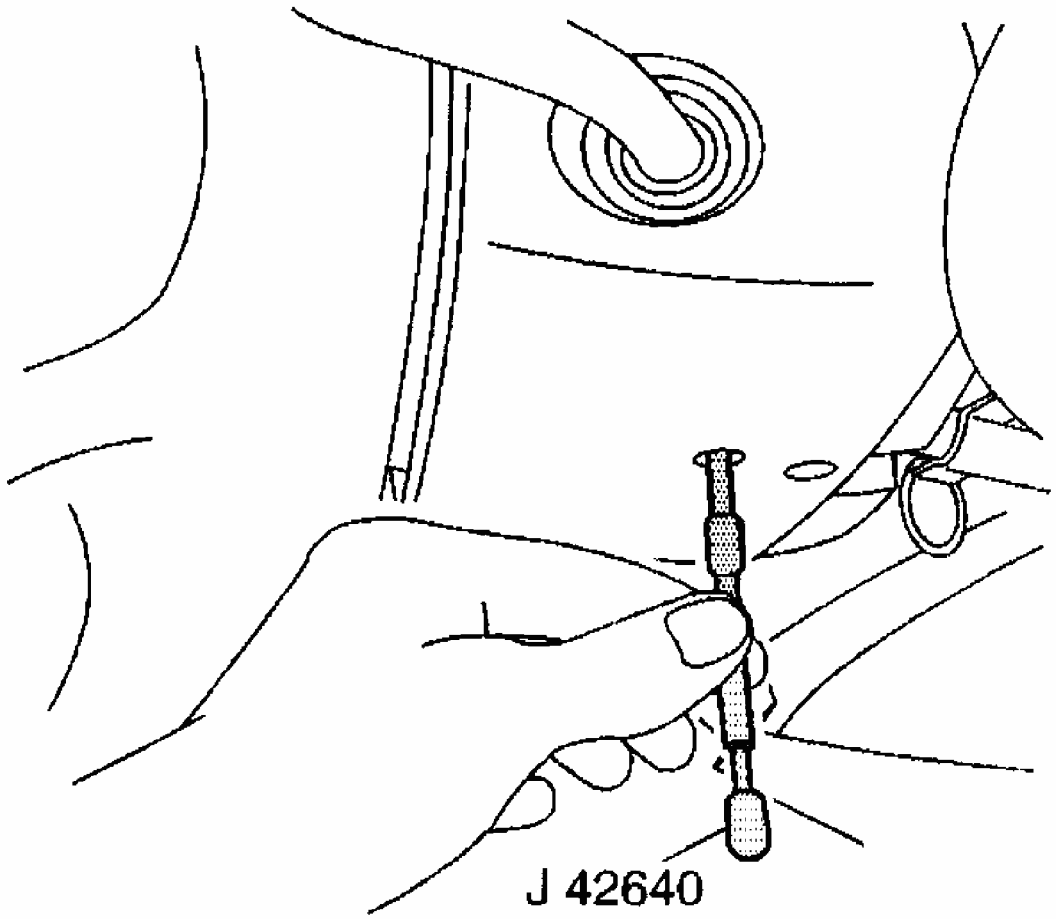

Fig. 24: Locking Steering Column Using Steering Column Anti-Rotation Pin
Courtesy of GENERAL MOTORS CORP.

3. Remove the intermediate shaft shield from the lower intermediate shaft.

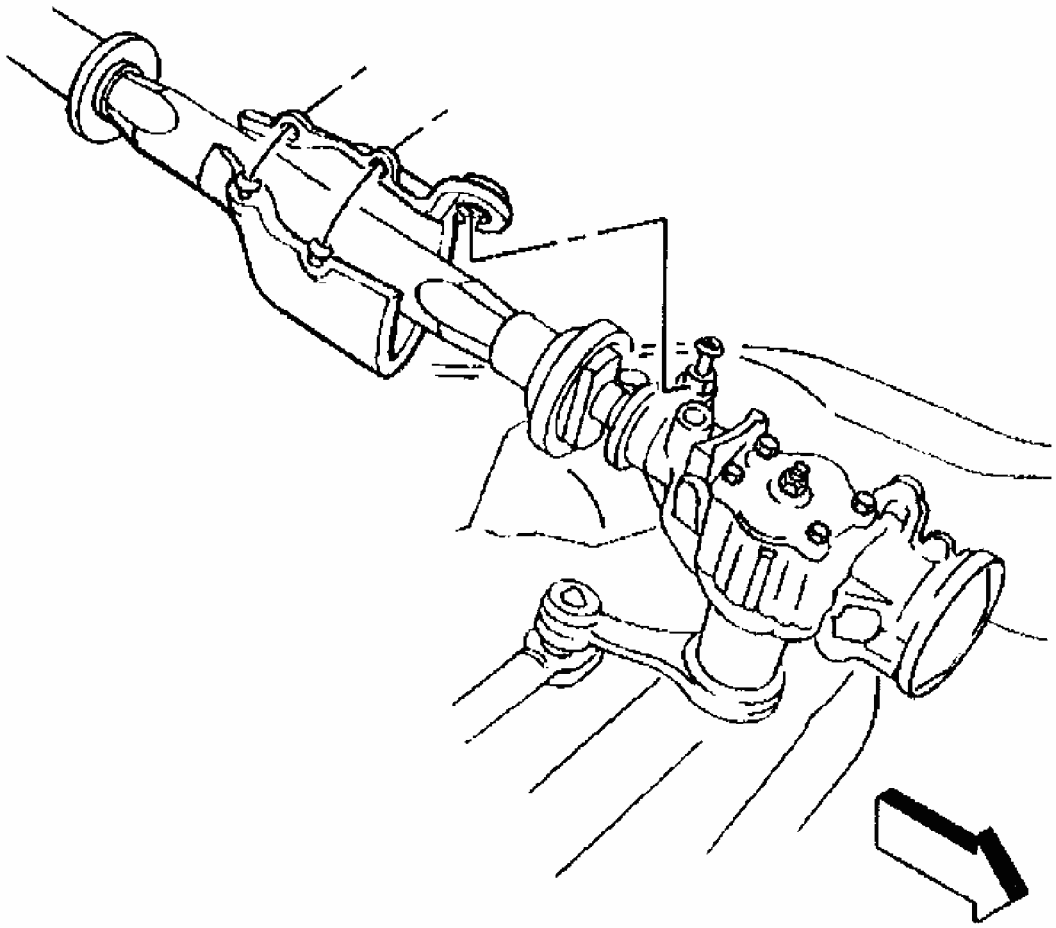

Fig. 25: Removing Intermediate Shaft Shield From Lower Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

4. Remove the lower intermediate shaft coupling to steering gear input shaft retaining bolt.

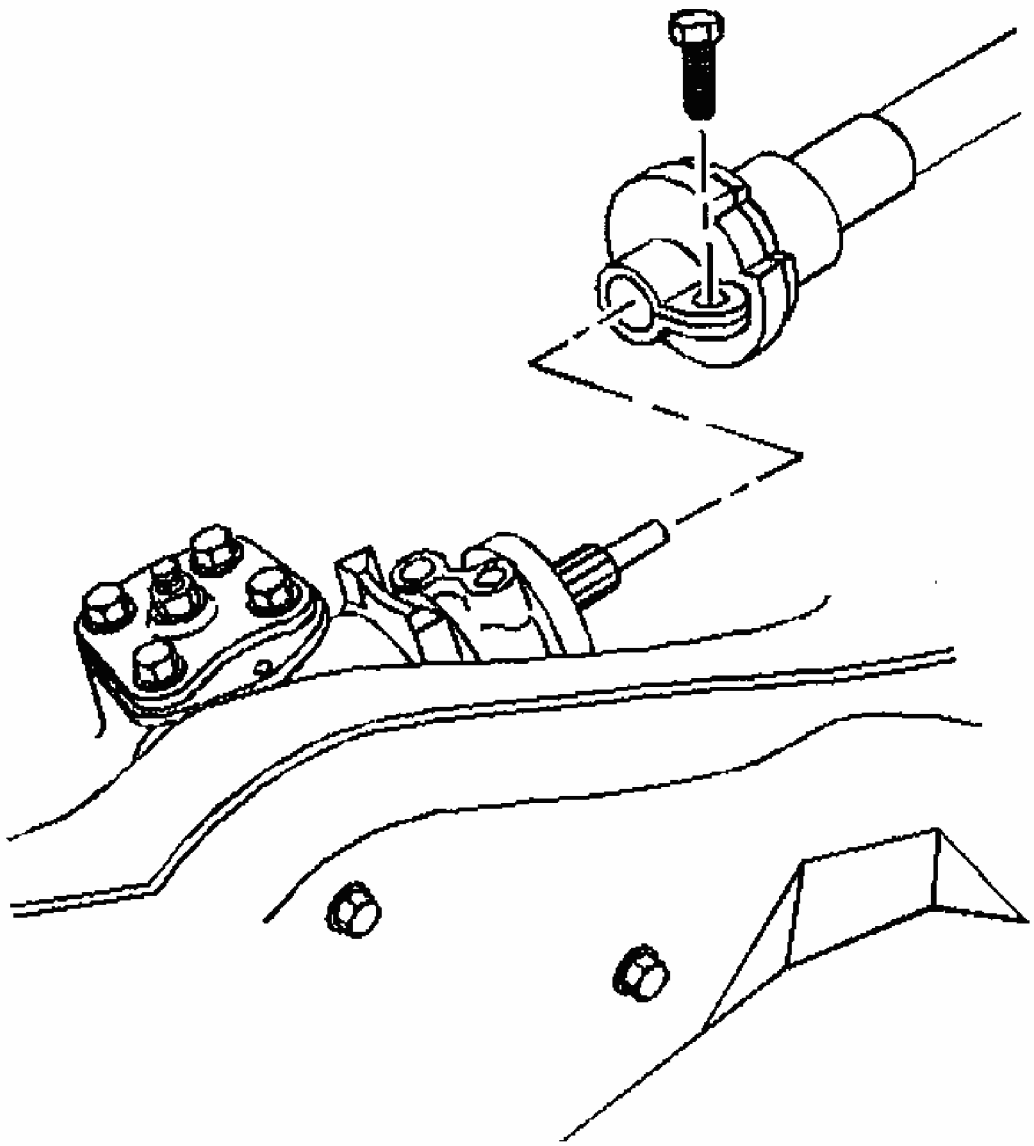

Fig. 26: Removing Lower Intermediate Shaft Coupling To Steering Gear Input Shaft Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

5. Remove the lower intermediate shaft from the vehicle.
    1. Slide the lower intermediate shaft rearward in order to remove the lower intermediate shaft coupling from the steering gear input shaft.
    2. Slide the lower intermediate shaft forward in order to remove the lower intermediate shaft from the upper intermediate shaft.

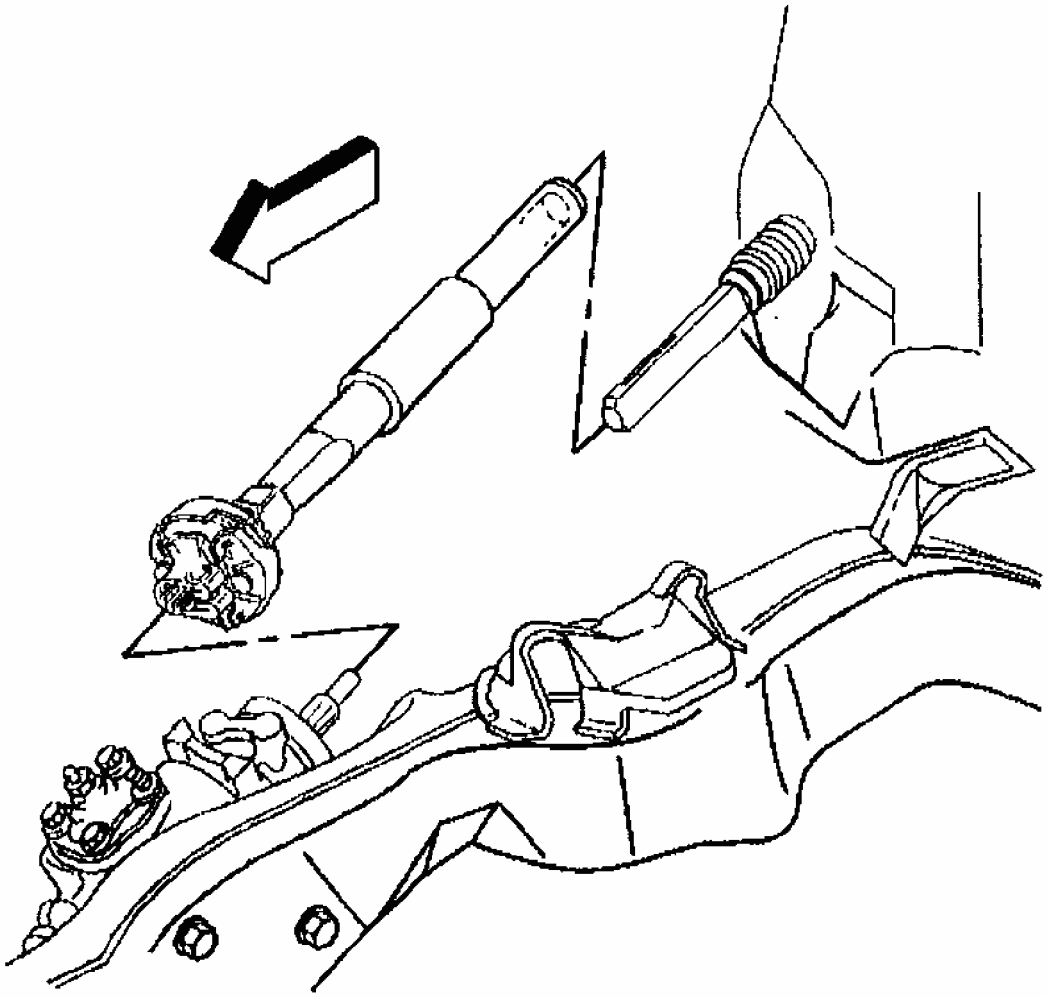

Fig. 27: Removing Lower Intermediate Shaft From Vehicle
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the lower intermediate shaft.
   5.1. Slide the lower intermediate shaft rearward in order to install the lower intermediate shaft to the upper intermediate shaft.
   5.2. Slide the lower intermediate shaft forward in order to install the lower intermediate shaft coupling to the steering gear input shaft.

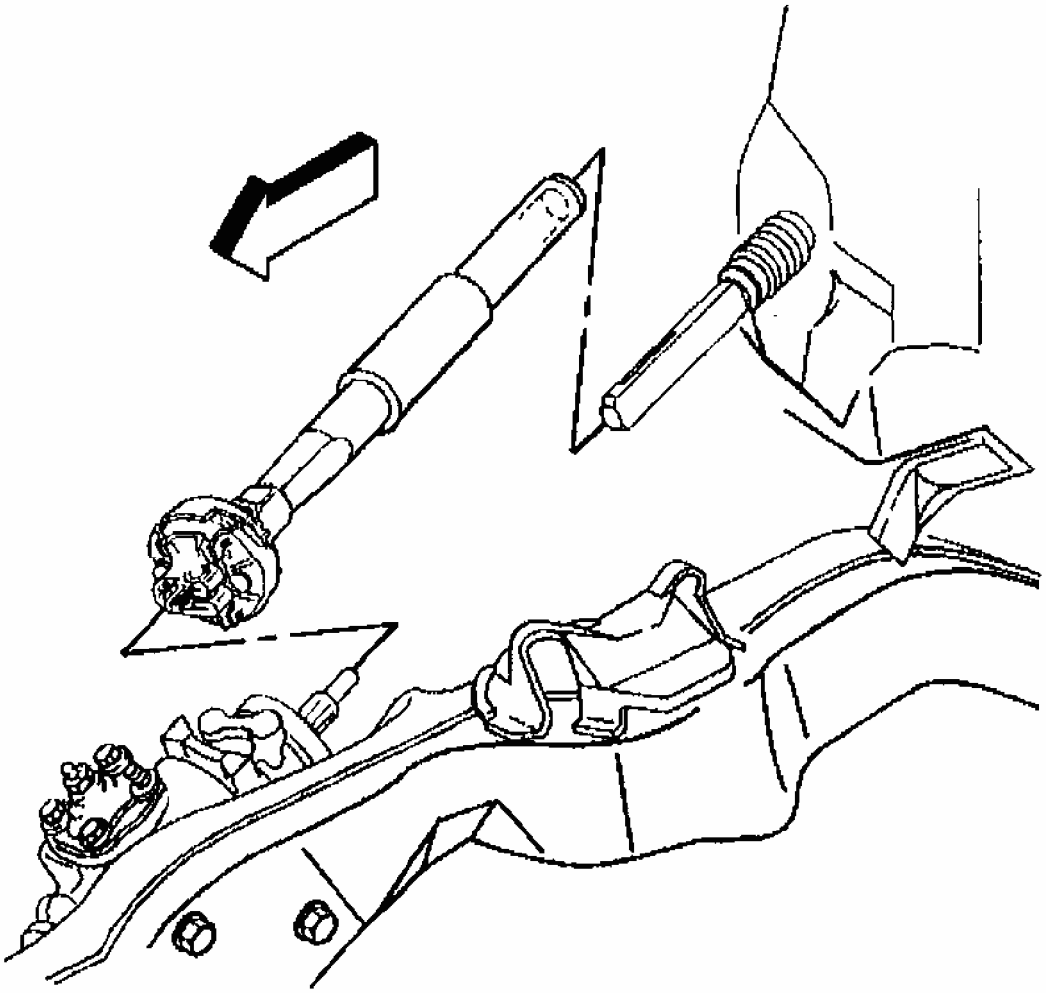

Fig. 28: Lower Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the lower intermediate shaft coupling to steering gear input shaft retaining bolt.

Tighten

Tighten the lower intermediate shaft coupling to steering gear input shaft retaining bolt to 35 N.m (25 lb ft).

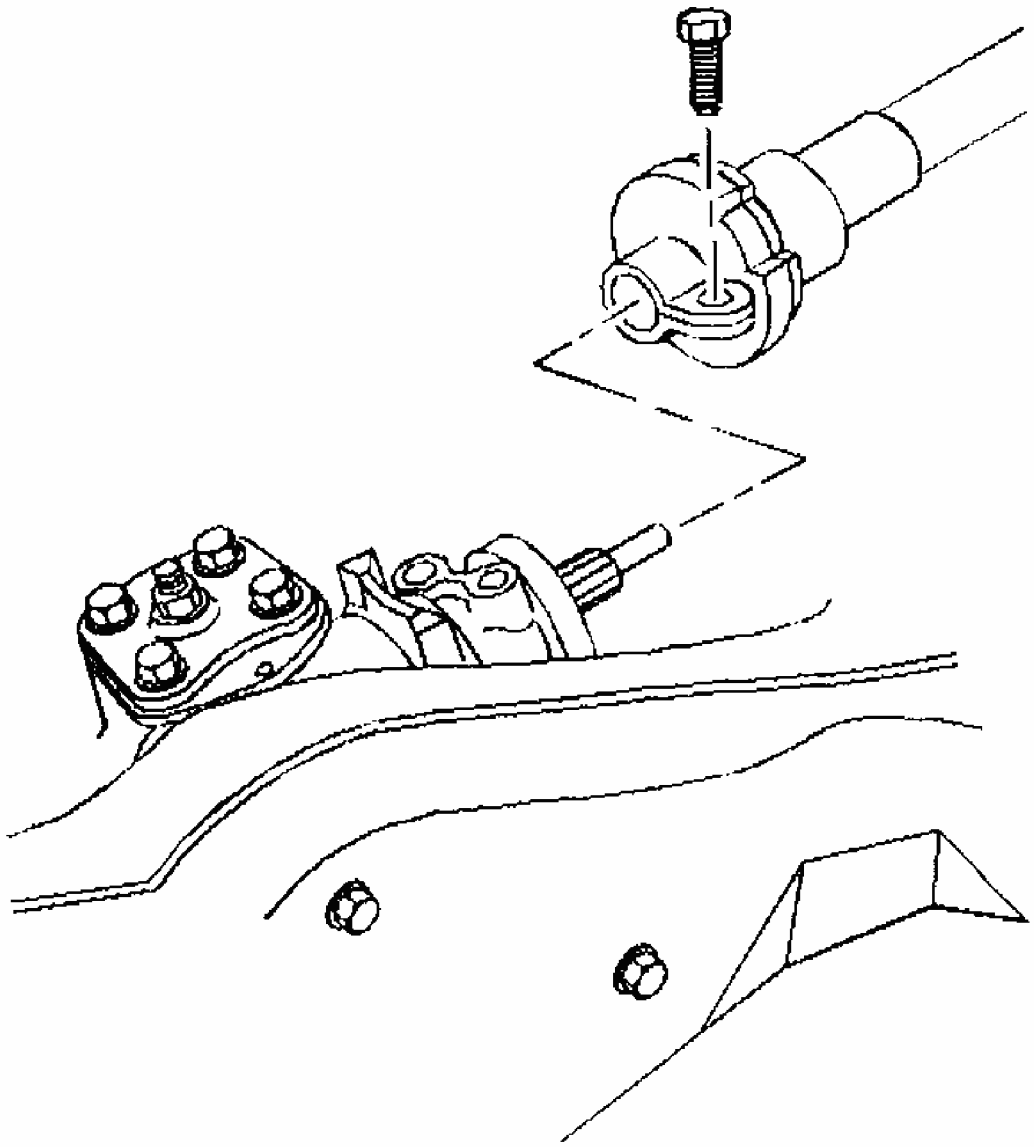

Fig. 29: Installing Lower Intermediate Shaft Coupling To Steering Gear Input Shaft Retaining Bolt
Courtesy of GENERAL MOTORS CORP.

3. Install the shield to the lower intermediate shaft.
4. Install the air cleaner assembly. Refer to AIR CLEANER OUTLET RESONATOR REPLACEMENT in Engine Controls - 2.2L or AIR CLEANER ASSEMBLY REPLACEMENT in Engine Controls - 4.3L.

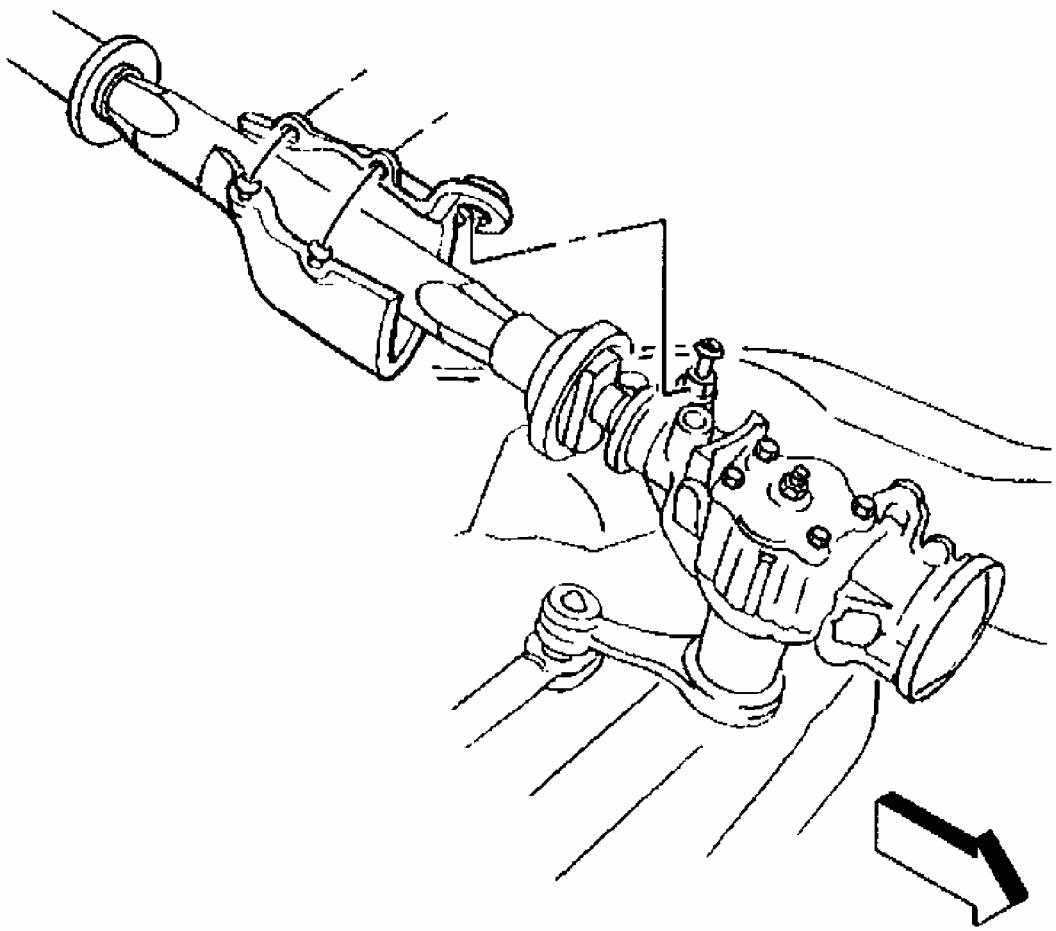

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Fig. 30: Installing Shield To Lower Intermediate Shaft
Courtesy of GENERAL MOTORS CORP.

5. Unlock the steering column by removing *J 42640* from the steering column lower trim cover access hole.

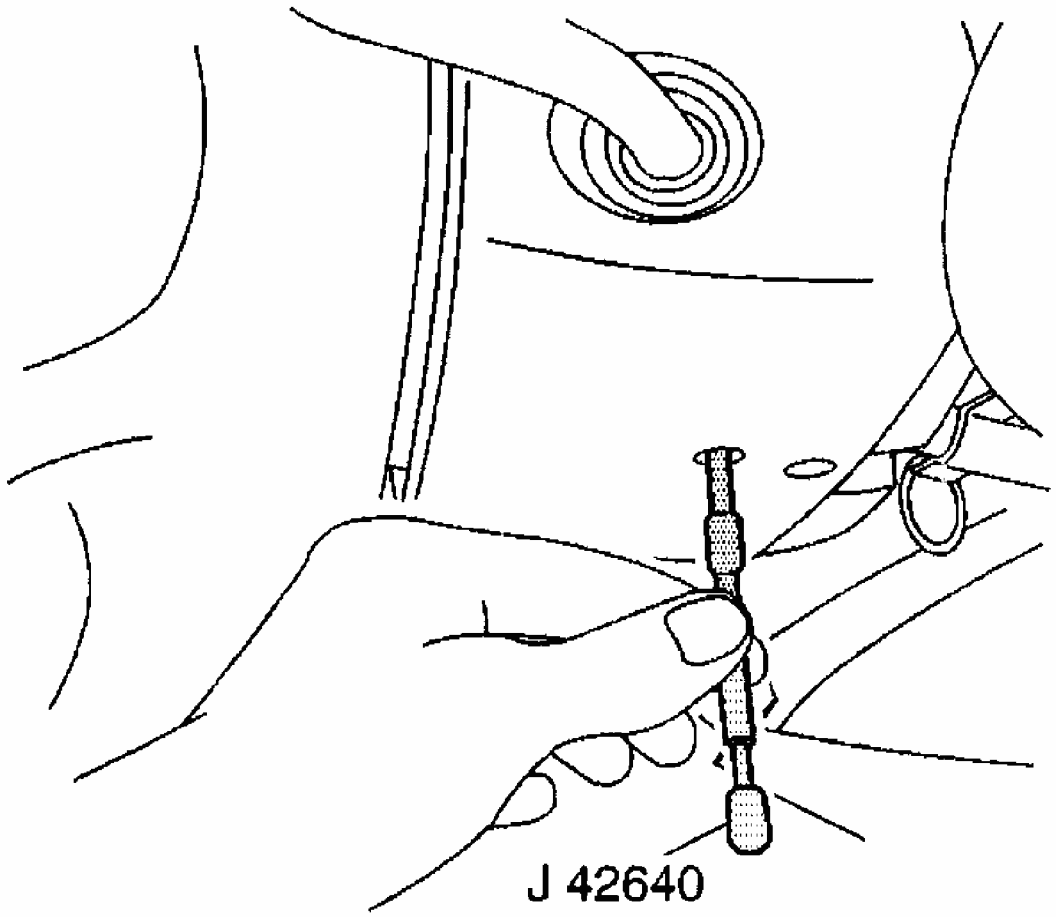

Fig. 31: Unlocking Steering Column Using Steering Column Anti-Rotation Pin
Courtesy of GENERAL MOTORS CORP.

STEERING COLUMN ACCIDENT DAMAGE INSPECTION

Inspection Procedure

NOTE: Vehicles involved in accidents that result in any of the following kinds of damage or situations, may also have a damaged or misaligned steering column:

- Frame damage
- Major body damage
- Sheet metal damage
- If the steering column has been impacted
- If the supplemental inflatable restraints system was deployed

- Inspect the capsules on the steering column bracket assembly. All capsules must be securely seated in the bracket slots and inspected for any loose conditions when pushed or pulled by hand.
- Observe how the bracket is attached to the jacket assembly.
  - If the capsules are not securely seated and the bracket is bolted to the jacket assembly, replace only the bracket.
  - If the capsules are not securely seated and the bracket is welded to the jacket assembly, replace only the jacket assembly.

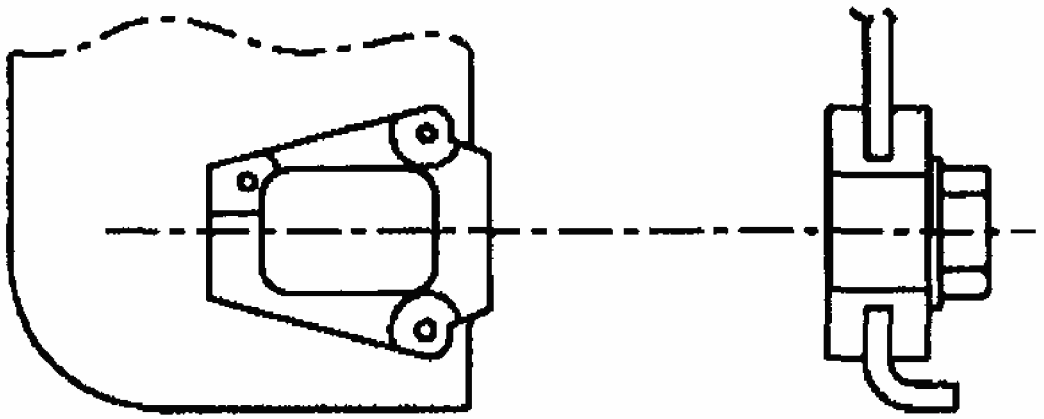

Fig. 32: Identifying Alignment Of Steering Column
Courtesy of GENERAL MOTORS CORP.

- Inspect for jacket assembly collapse by measuring the distance from the lower edge of the upper jacket to a defined point on the lower jacket. Replace the jacket assembly if the measured dimensions are not within specifications.

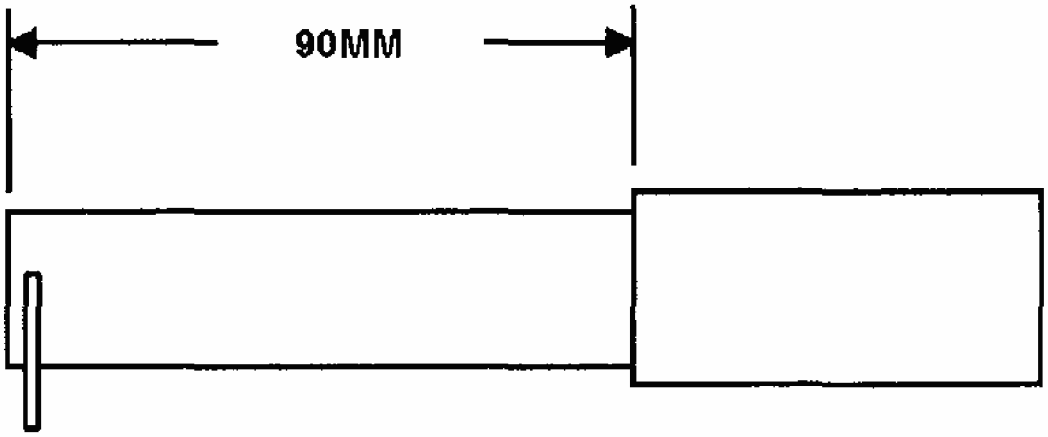

Fig. 33: Identifying Distance From Lower Edge Of Upper Jacket To Defined Point On Lower Jacket
Courtesy of GENERAL MOTORS CORP.

NOTE: Before the shaft is rotated, remove the inflatable restraint coil assembly from the steering column and allow it to hang freely. Failure to do so may damage the coil assembly.

- Visually inspect the steering shaft for sheared injected plastic. If the steering shaft shows sheared plastic, replace the steering shaft.
- Any frame damage that could cause a bent steering shaft must have the steering shaft runout checked. Using a dial indicator (1) at the lower end of the steering shaft, rotate the steering wheel. The runout must not exceed 1.60 mm (0.06 in).

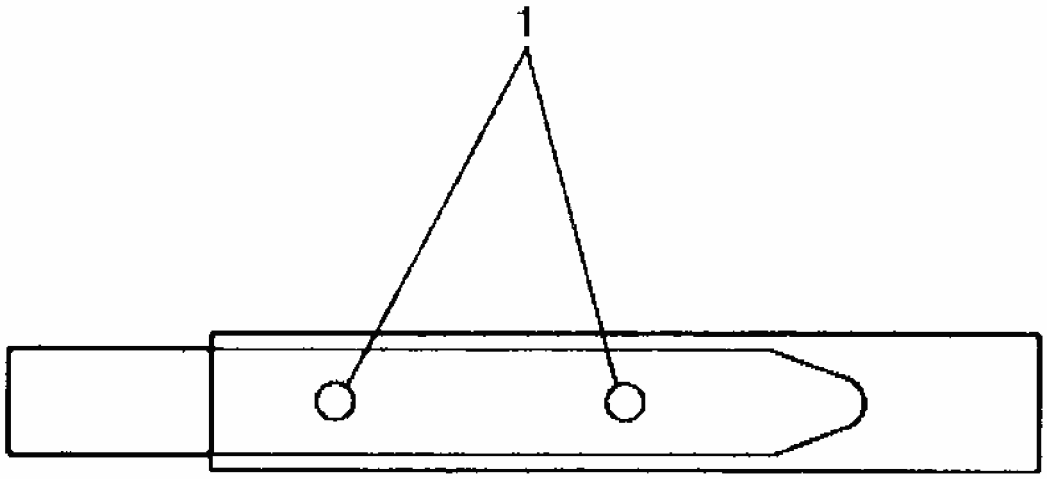

Fig. 34: Identifying Dial Indicator
Courtesy of GENERAL MOTORS CORP.

STEERING COLUMN TRIM COVERS REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the steering wheel from the column. Refer to **STEERING WHEEL REPLACEMENT** .
3. Remove the tilt lever from the lower trim cover. Refer to **TILT LEVER REPLACEMENT** .

   Important: You must check for 2 pan head tapping screws (1,2) in the lower trim cover before removal.

4. If necessary, remove the 2 pan head tapping screws (1,2) from the lower trim cover (3). Remove the lower trim cover (3).

   If screws are not present in the lower trim cover, proceed to the next step.

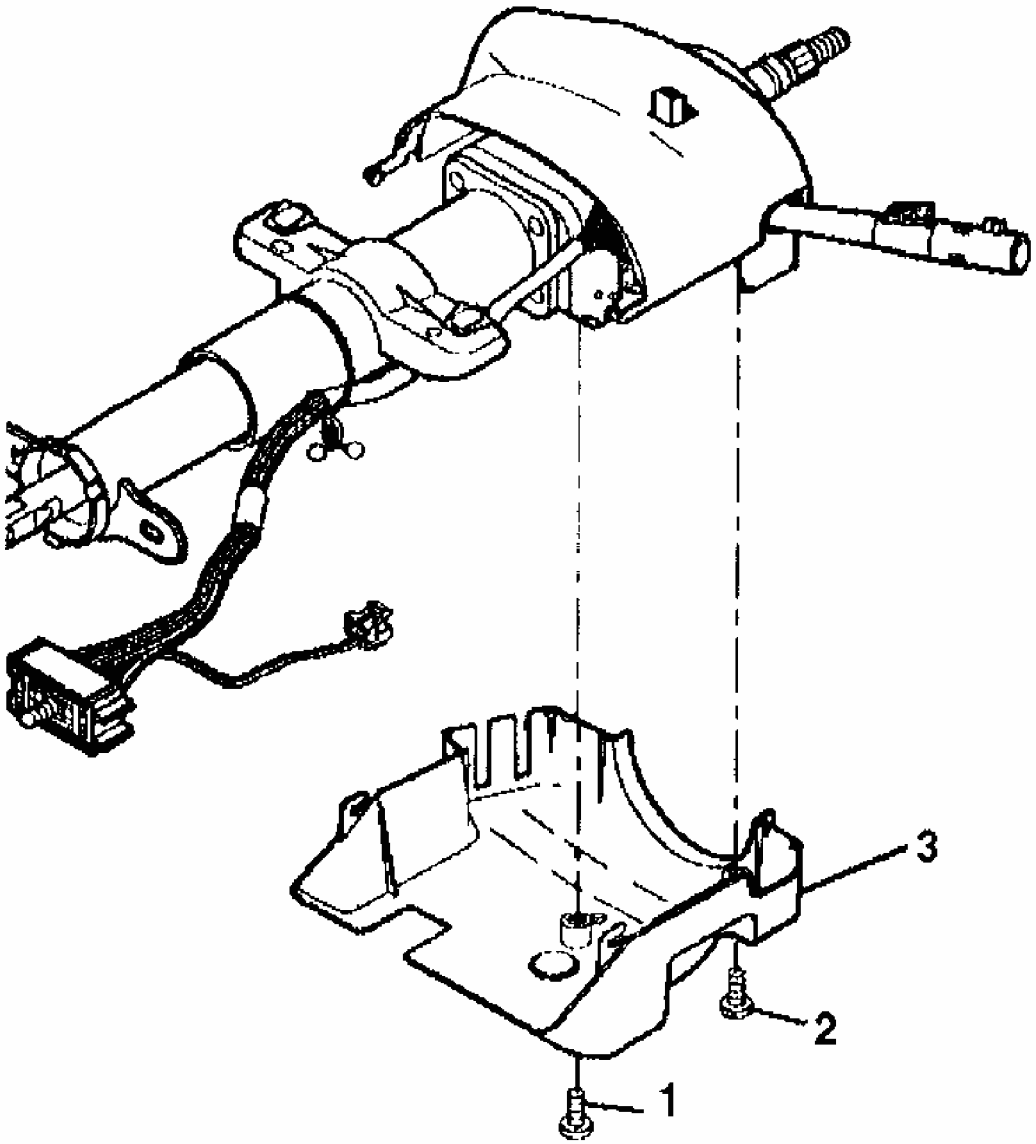

Fig. 35: Lower Trim Cover
Courtesy of GENERAL MOTORS CORP.

5. Gently unsnap the lower trim cover from the upper trim cover.

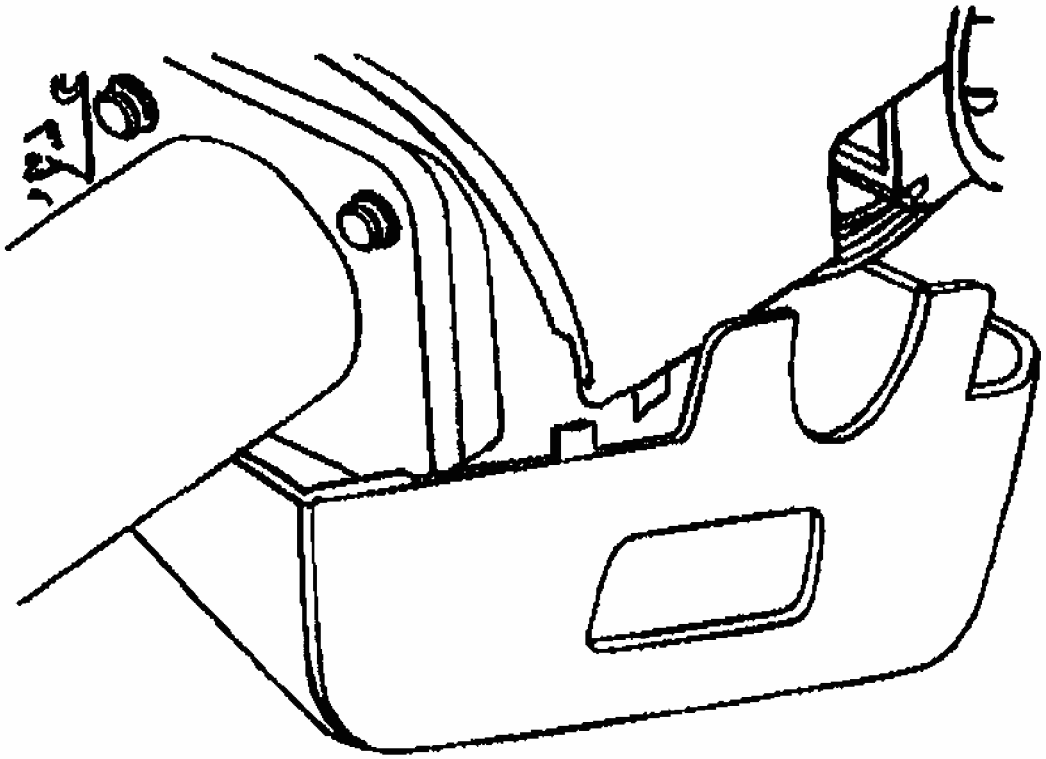

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Fig. 36: Gently Removing Lower Trim Cover From Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

Important: You must check for 2 pan head tapping screws (1,2) in the lower trim cover (3) before removal.

6. If necessary, remove 1 TORX(R) head screw (1) from the upper trim cover (2).

   If a screw is not present, remove the upper trim cover (2).

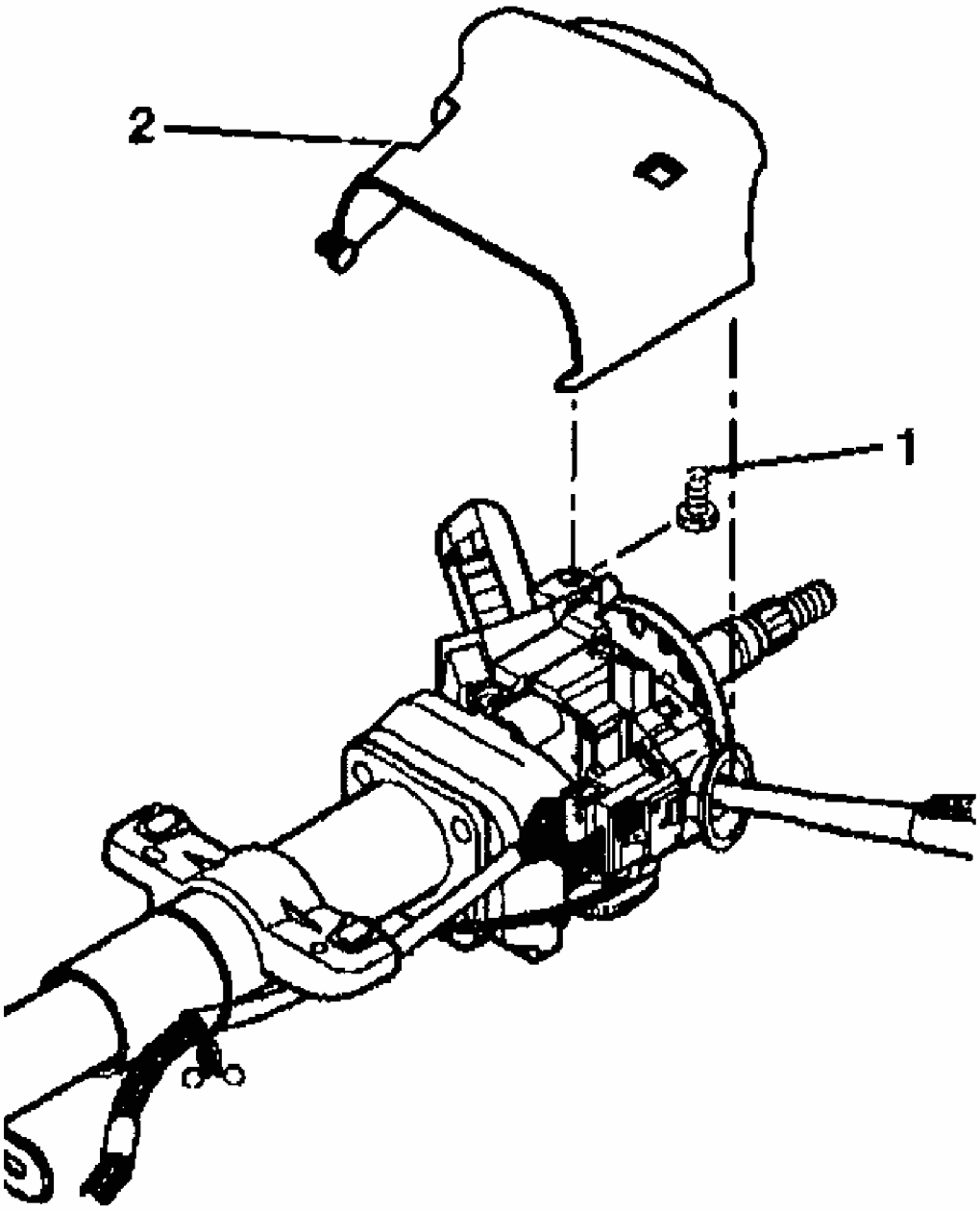

Fig. 37: Upper Trim Cover
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

Important: If the snap on/off feature on the trim covers was damaged during the removal procedure, you must use screws for the installation procedure. If screws were present in the trim covers before the removal procedure, you must use the screws during the installation procedure.

If there was not any damage done to the trim covers during the removal procedure and no screws were present, proceed to step 3.

1. Install the upper trim cover (2) onto the steering column. Install 1 TORX(R) head screw (1) into the upper trim cover (2).

   Tighten

   Tighten the screw to 1.5 N.m (13 lb in).

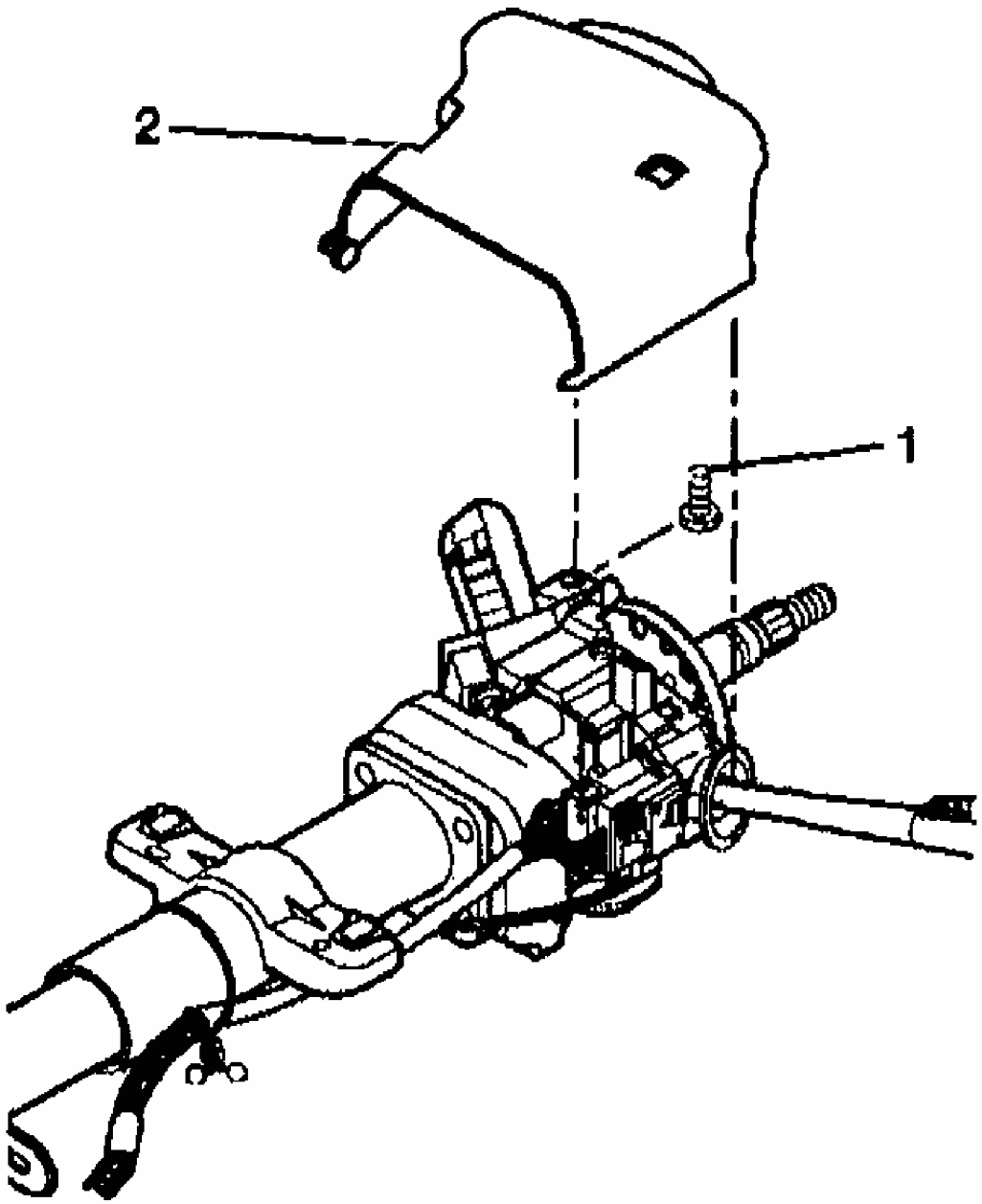

Fig. 38: Installing Upper Trim Cover Onto Steering Column
Courtesy of GENERAL MOTORS CORP.

2. Install the lower trim cover (3) onto the steering column. Install 2 pan head tapping screws (1, 2) into the lower trim cover (3).

Tighten

- Tighten 1 pan head tapping screw (1) to 3.5 N.m (31 lb in).
- Tighten 1 pan head tapping screw (2) to 2 N.m (18 lb in).

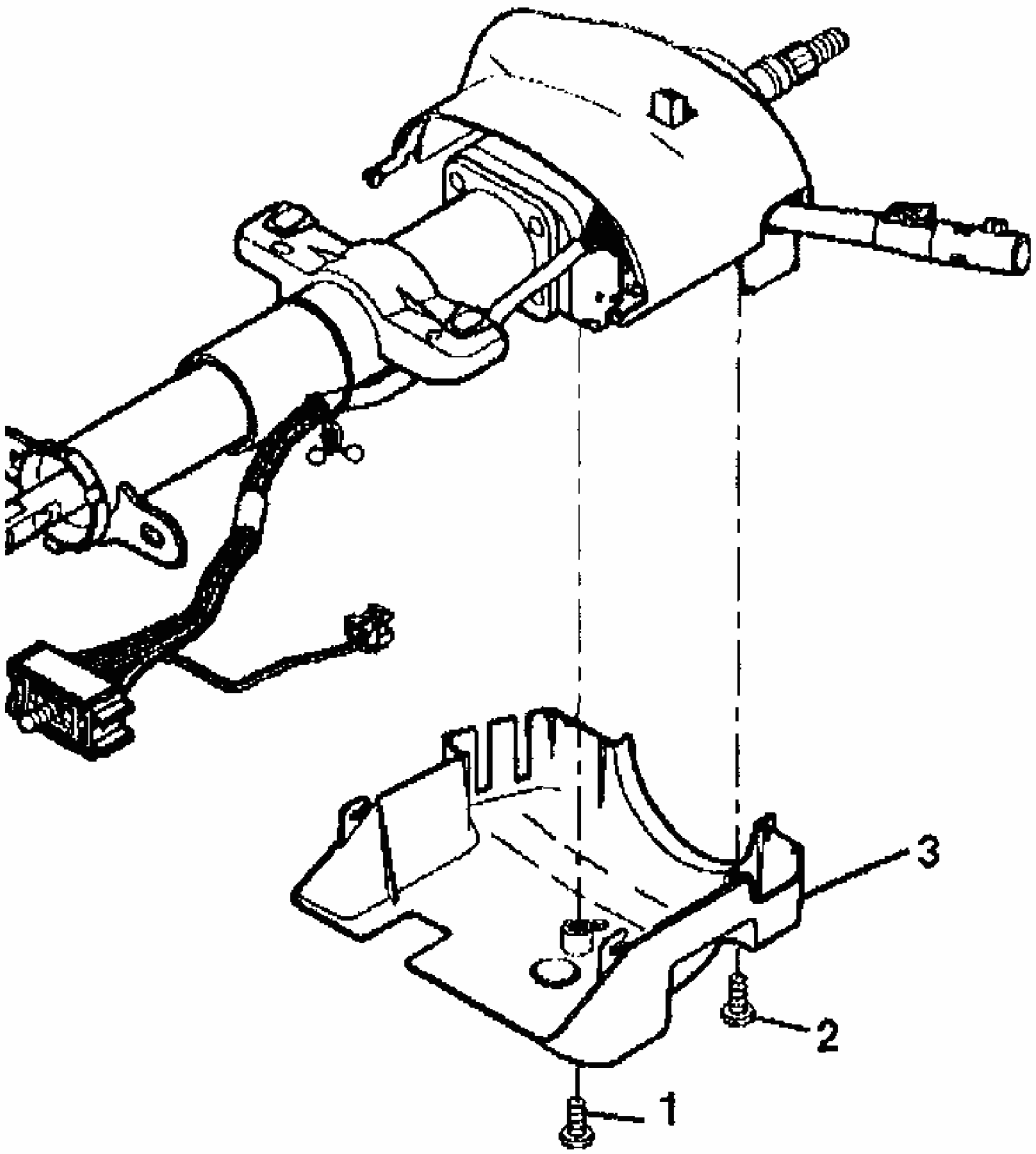

Fig. 39: Installing Lower Trim Cover Onto Steering Column
Courtesy of GENERAL MOTORS CORP.

3. Install the upper and lower trim covers onto the steering column.

Important: If column shift, the shift lever seal must be seated in the trim covers.

4. Slide the shift lever seal down the shift lever.
5. Gently snap the upper and lower trim covers together.
6. Install the tilt lever into the lower trim cover. Refer to **TILT LEVER REPLACEMENT** .
7. Install the steering wheel onto the steering column. Refer to **STEERING WHEEL REPLACEMENT** .
8. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

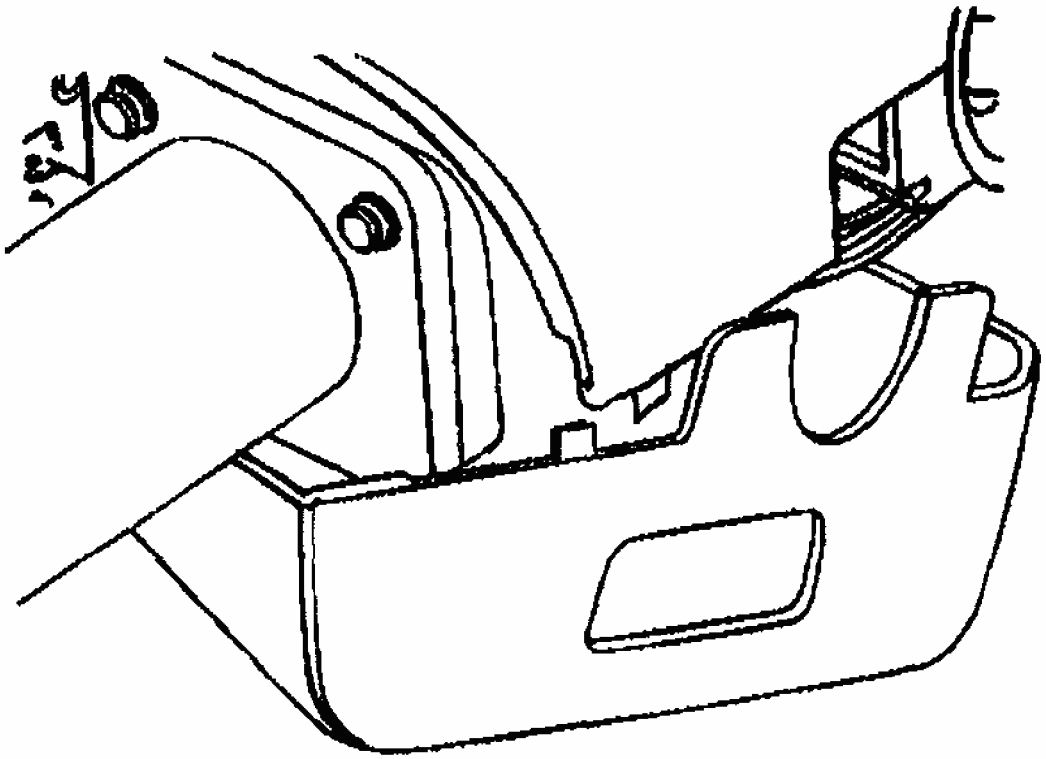

Fig. 40: Installing Upper & Lower Trim Covers Onto Steering Column
Courtesy of GENERAL MOTORS CORP.

IGNITION SWITCH REPLACEMENT

Tools Required

J 42759 Ignition Switch Connector Release Tool

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .

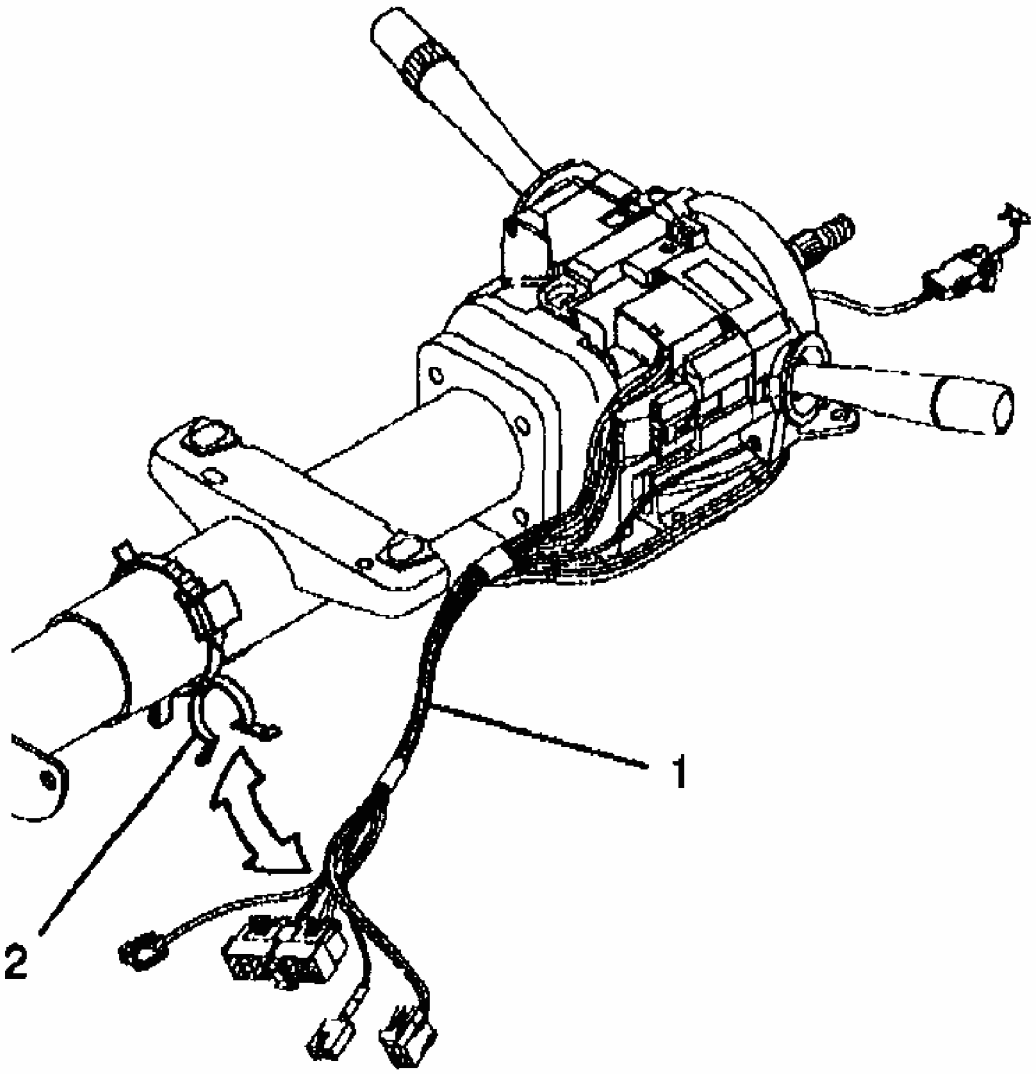

Fig. 41: Removing Wire Harness Strap From Steering Column & Wire Harness Assembly
Courtesy of GENERAL MOTORS CORP.

Important: The abrasion sleeve located on the steering column wire harness assembly must be reinstalled. Make note of what connector is coming out of the abrasion sleeve for installation purposes.

3. Remove the wire harness strap (2) from the steering column and the wire harness assembly (1).
4. Slide the 2 connectors (2) of the turn signal and multifunction switch assembly out of the bulkhead connector (1).

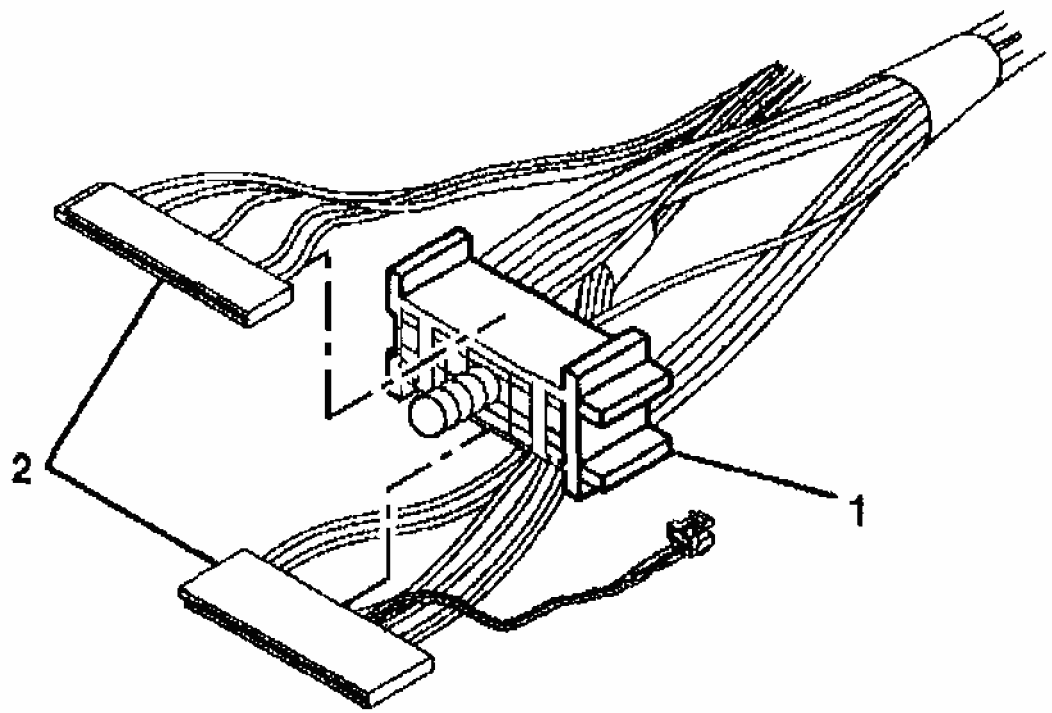

Fig. 42: Sliding Connectors Of Turn Signal And Multifunction Switch Assembly Out Of Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

5. Rotate the key alarm connector (1) 90 degrees.
6. Pull the key alarm connector (1) out of the ignition lock cylinder case (2).
7. Remove the passkey connector from the ignition lock cylinder case (2).

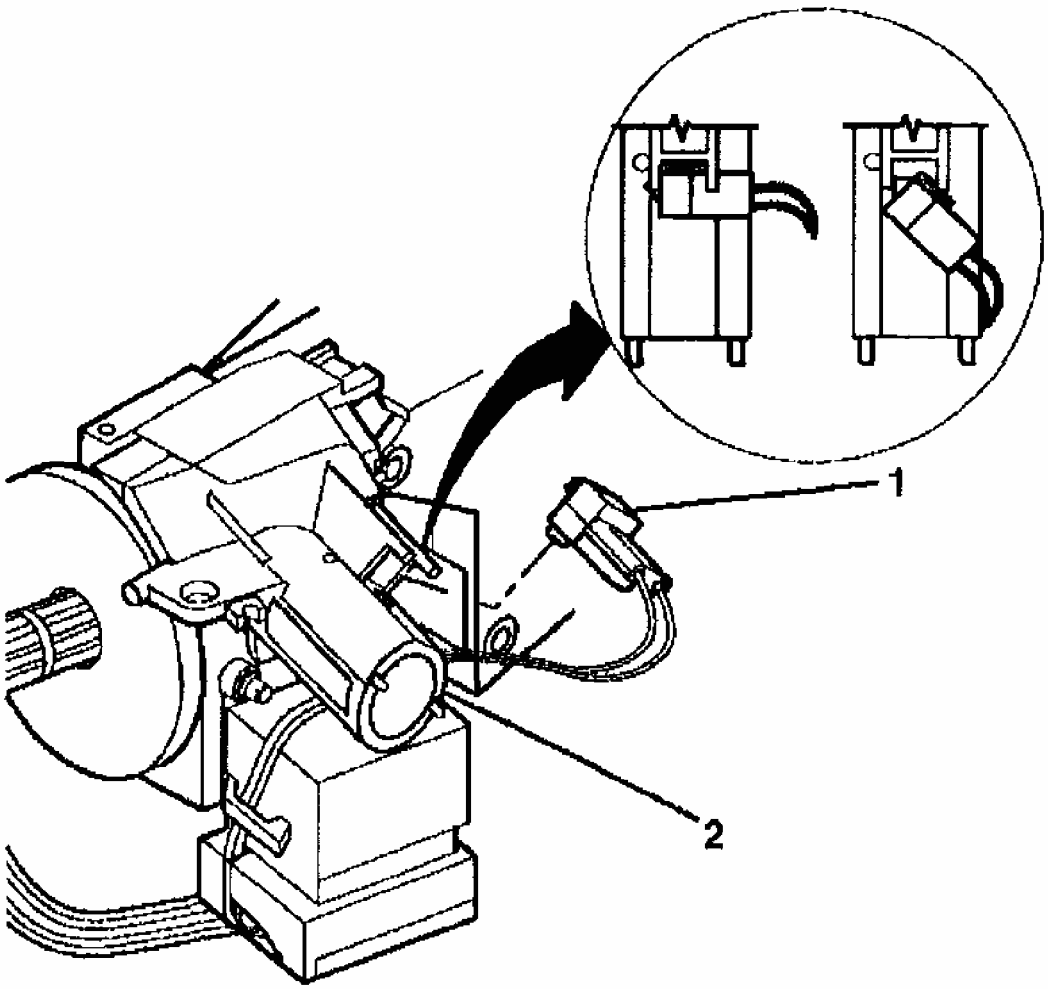

Fig. 43: Removing Key Alarm Connector From Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

8. Insert *J 42759* into the ignition lock cylinder case (1) and slide the ignition switch (2) out.

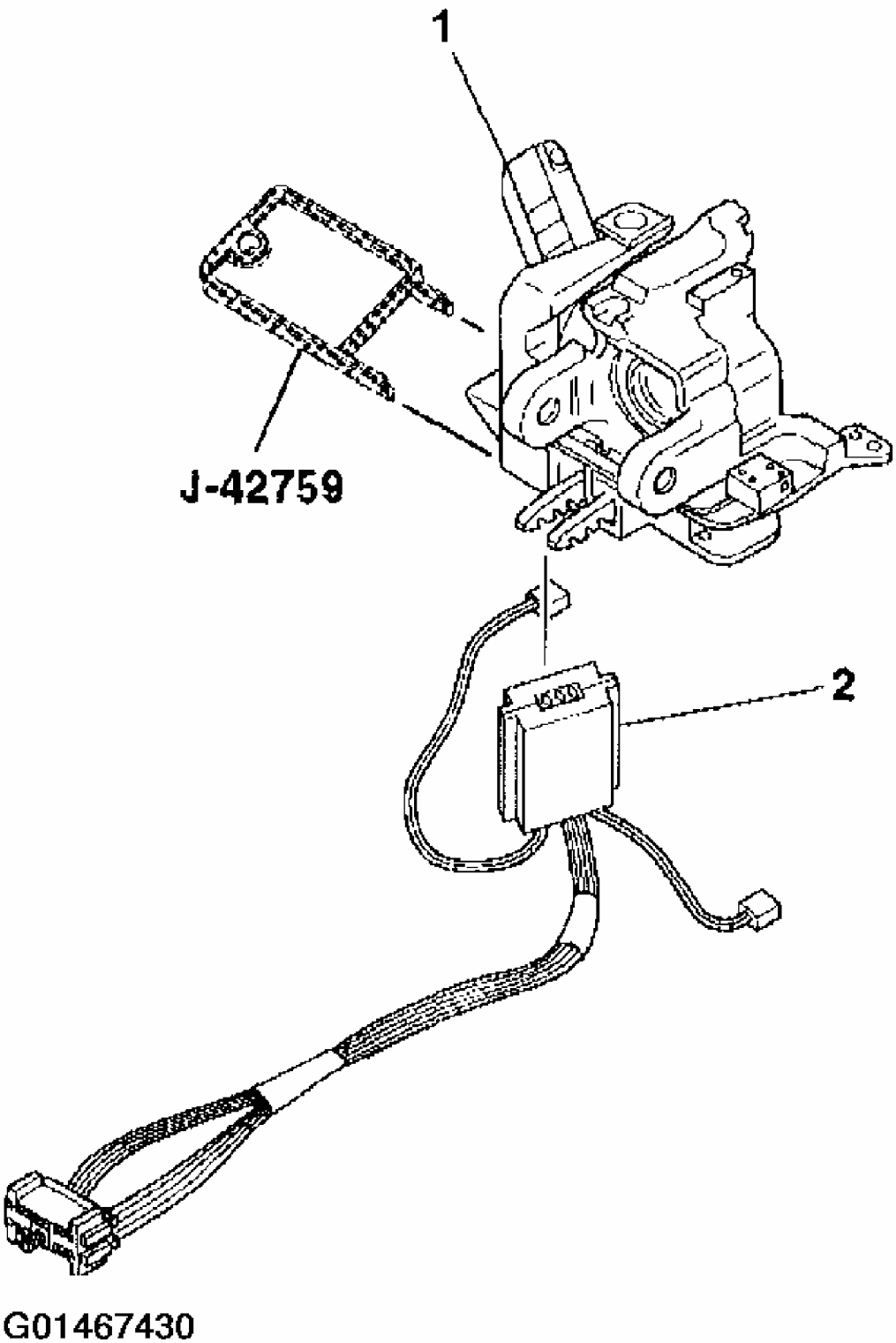

Fig. 44: Inserting Ignition Switch Connector Release Tool Into Ignition Lock Cylinder

Case
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the ignition lock cylinder case (1) and slide the ignition switch (2) in.

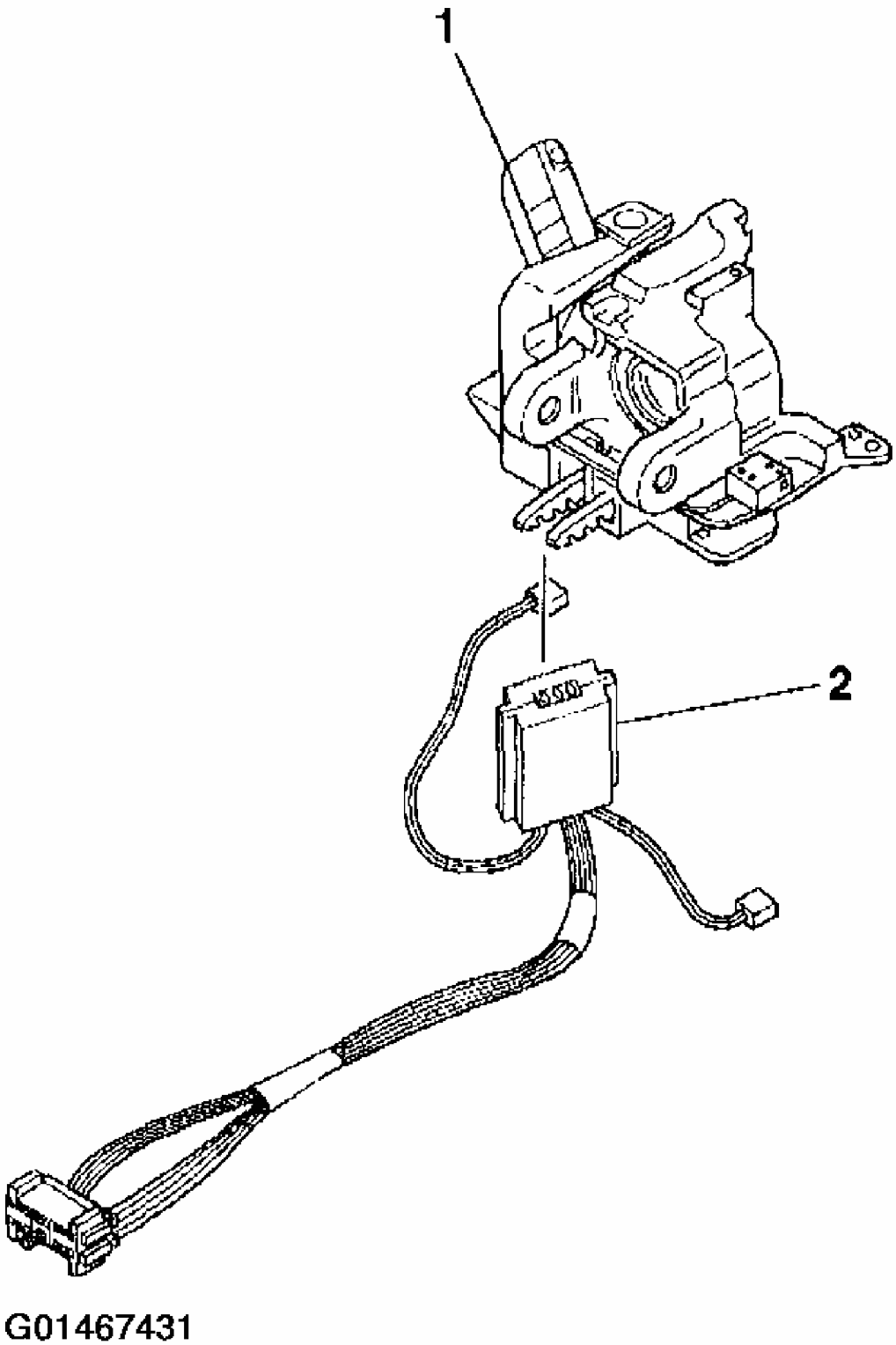

Fig. 45: Installing Ignition Lock Cylinder Case & Slide Ignition Switch In

Courtesy of GENERAL MOTORS CORP.

2. Push the key alarm connector (1) into the ignition lock cylinder case (2).
3. Rotate the key alarm connector (1) 90 degrees so that the key alarm connector (1) locks into place.
4. Install the passkey connector into the ignition lock cylinder case (2).

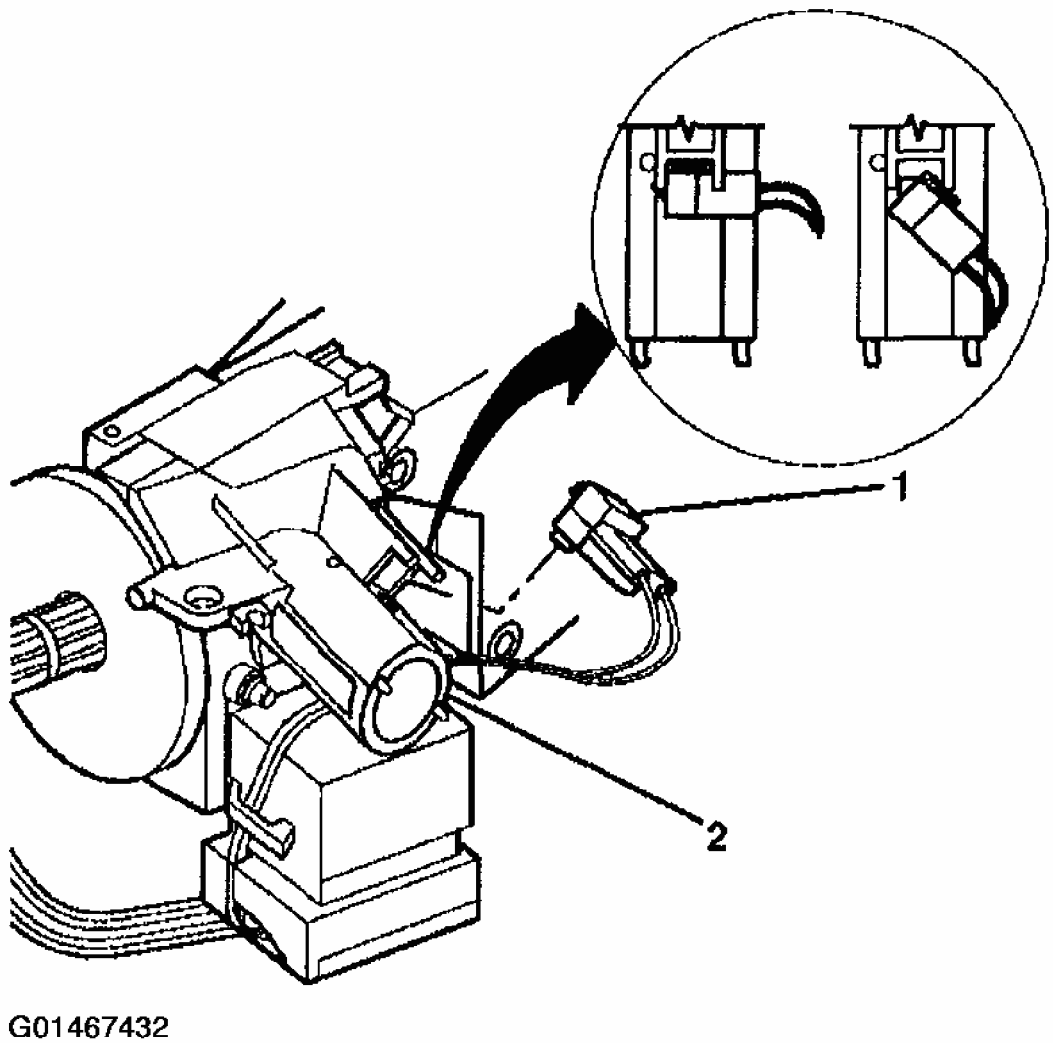

Fig. 46: Installing Key Alarm Connector Into Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

5. Slide the 2 connectors (2) of the turn signal and multifunction switch assembly into the bulkhead connector (1).

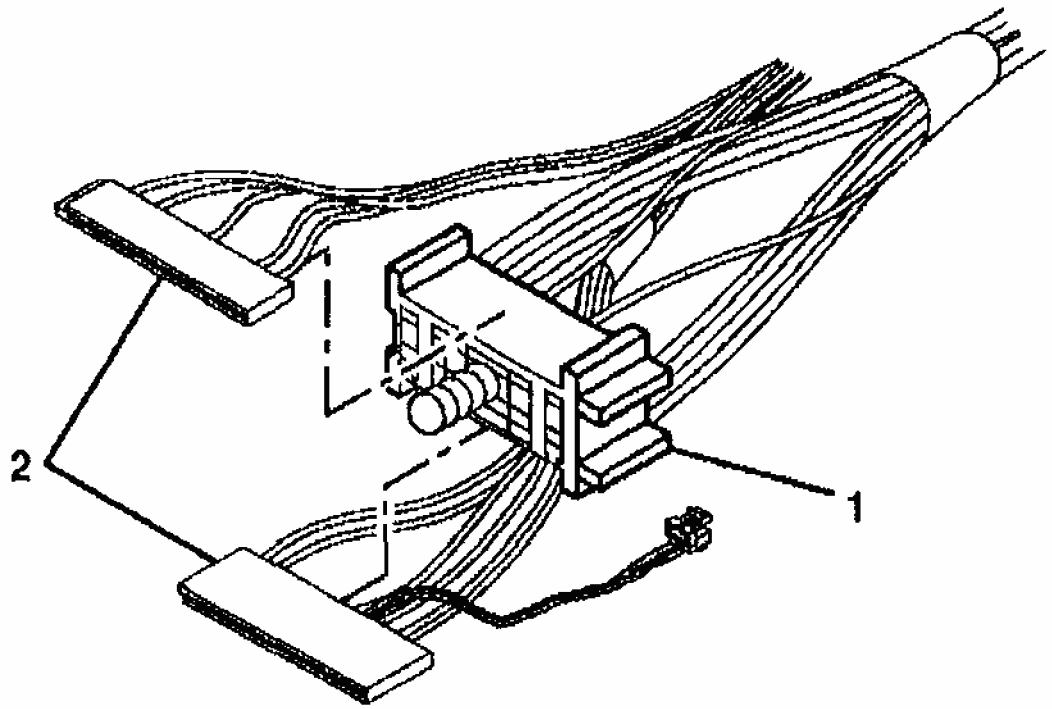

Fig. 47: Sliding Connectors Of Turn Signal & Multifunction Switch Assembly Into Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

Important: The abrasion sleeve must be installed back onto the steering column wire harness assembly. The ignition lock cylinder case wires and connector must be hanging out of the middle of the abrasion sleeve.

6. Attach the wire harness strap (2) to the wire harness assembly (1) and the steering column.
7. Install the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
8. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

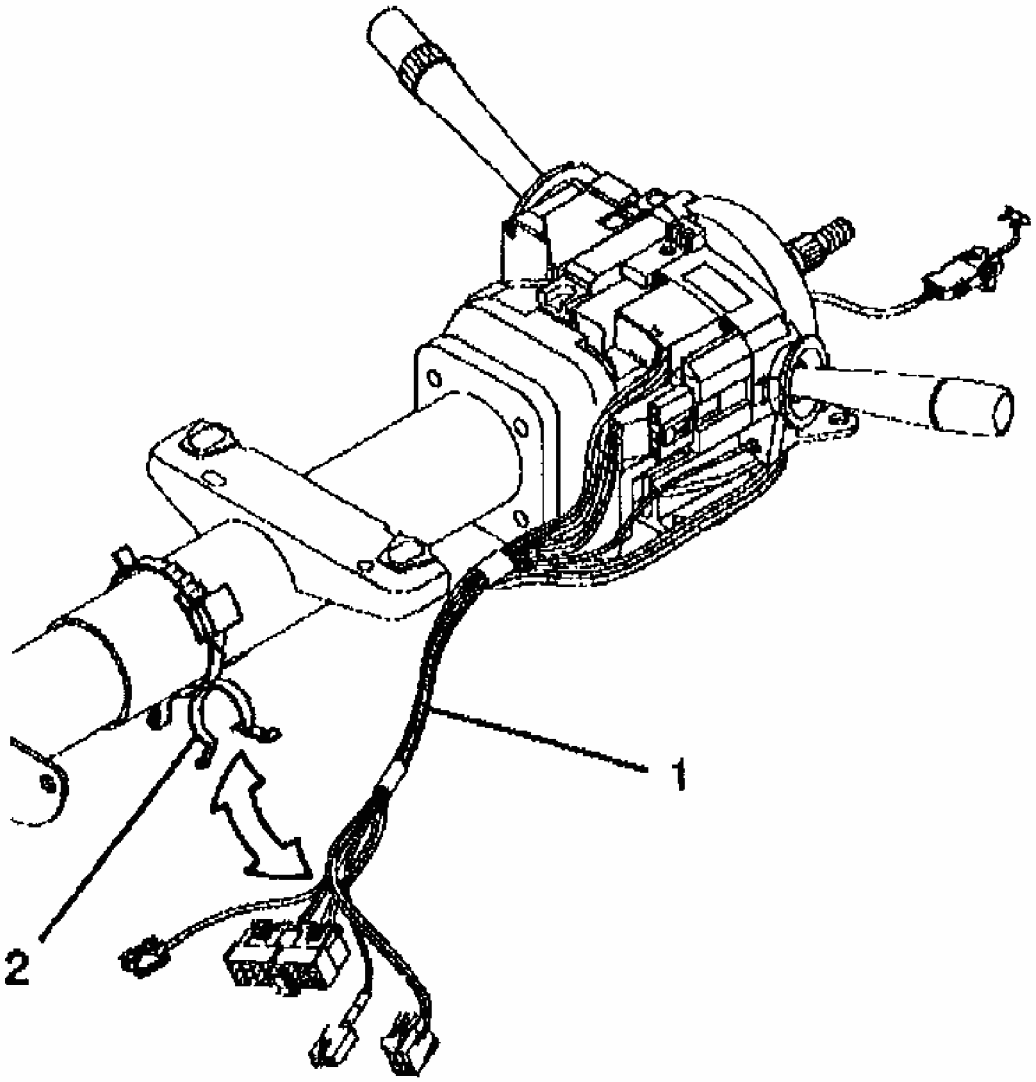

Fig. 48: Attaching Wire Harness Strap To Wire Harness Assembly & Steering Column
Courtesy of GENERAL MOTORS CORP.

IGNITION LOCK CYLINDER REPLACEMENT

Removal Procedure

CAUTION: Refer to BATTERY DISCONNECT CAUTION in Cautions and Notices.

1. Disconnect the battery negative cable. Refer to **BATTERY NEGATIVE CABLE**

DISCONNECT/CONNECT PROCEDURE in Engine Electrical.

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

2. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
3. Remove the steering column trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
4. Turn the ignition lock cylinder to the start position.
5. Insert the tip of an awl into the access hole (1) of the ignition lock cylinder.
6. Push down and hold the retaining pin of the ignition lock cylinder.
7. Release the ignition lock cylinder to the run position.

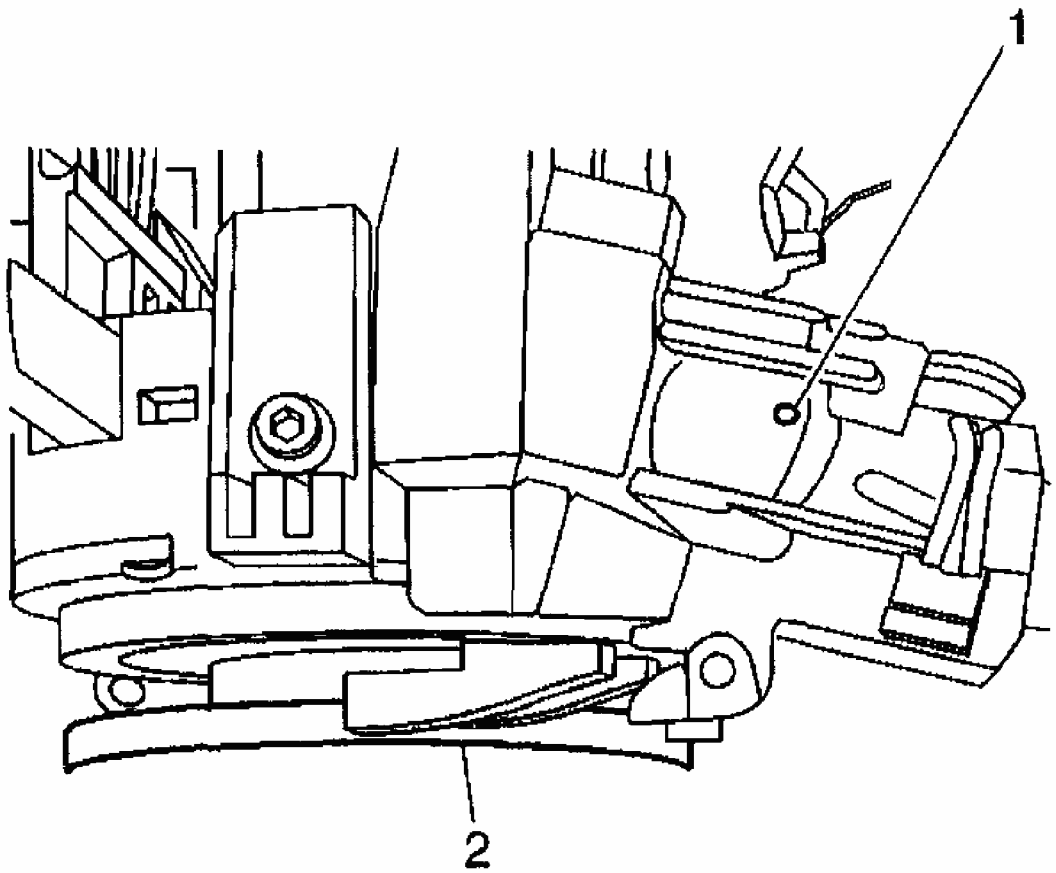

Fig. 49: Identifying Access Hole Of Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

8. Remove the ignition lock cylinder by pulling the cylinder away from the steering column.

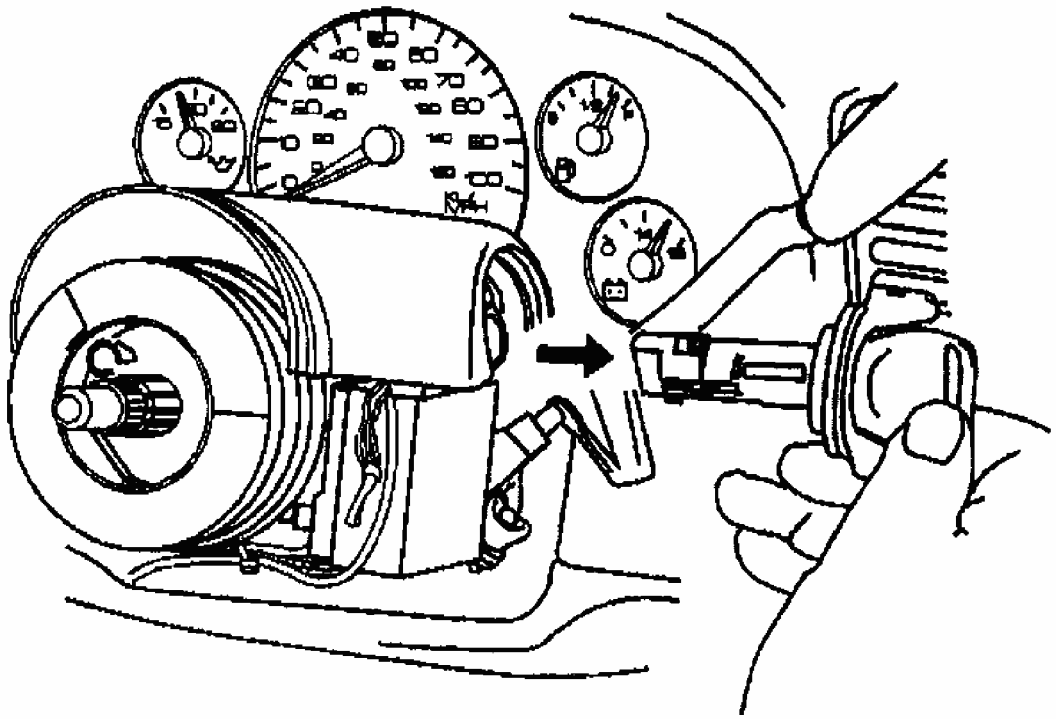

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Fig. 50: Removing Ignition Lock Cylinder By Pulling Cylinder Away From Steering Column
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the ignition lock cylinder by performing the following procedure:
   1.1. Align the positioning locking tab slot on the lock module to the positioning tab on the ignition lock cylinder.
   1.2. Push the lock cylinder in until the tab locks in the lock module.
2. Install the steering column trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
3. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
4. Connect the battery negative cable. Refer to **BATTERY NEGATIVE CABLE DISCONNECT/CONNECT PROCEDURE** in Engine Electrical.
5. Perform the Passlock(tm) learn procedure. Refer to **PROGRAMMING THEFT**

DETERRENT SYSTEM COMPONENTS in Theft Deterrent.

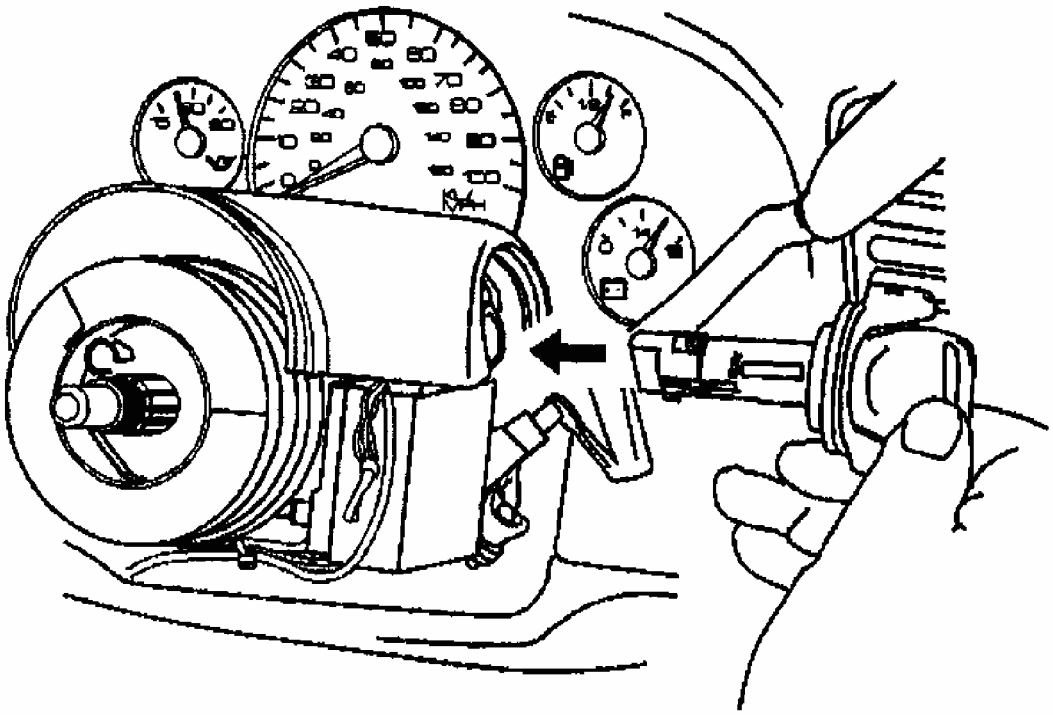

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Fig. 51: Ignition Lock Cylinder
Courtesy of GENERAL MOTORS CORP.

IGNITION LOCK CYLINDER CASE REPLACEMENT (FLOOR SHIFT)

Tools Required

- *J 23653-SIR* Steering Column Lock Plate Compressor
- *J 42759* Ignition Switch Connector Release Tool

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

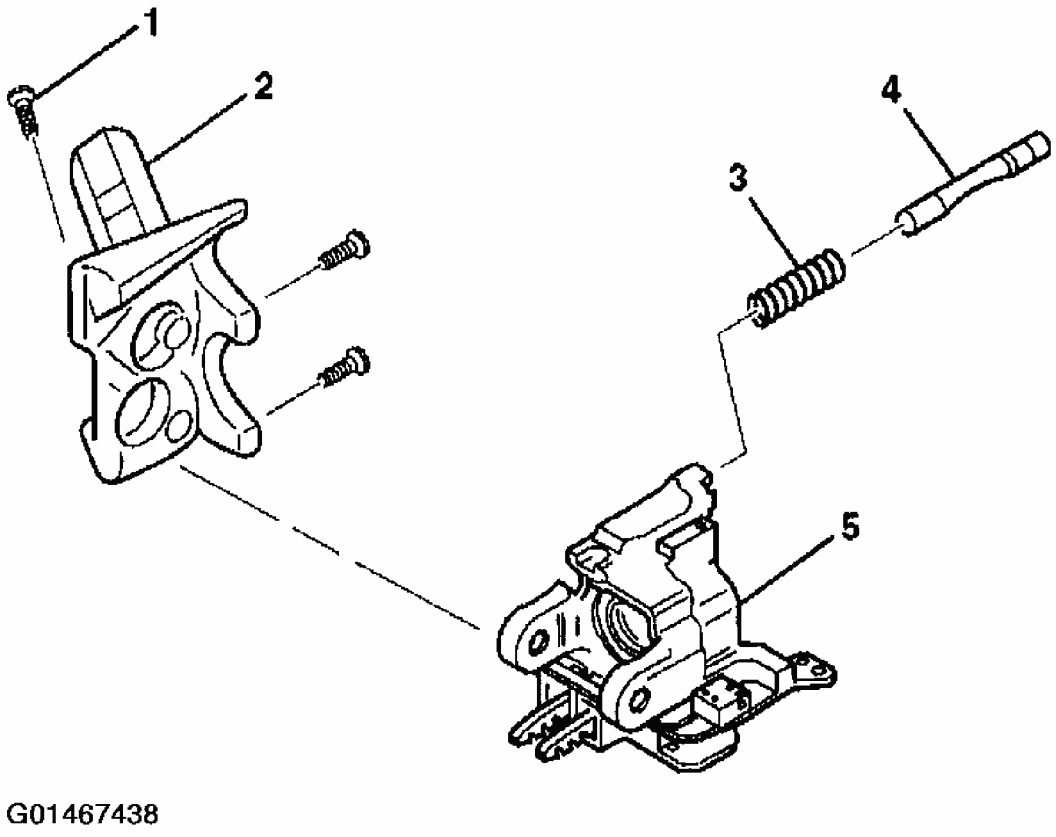

Fig. 52: Ignition Lock Cylinder Case (Floor Shift)
Courtesy of GENERAL MOTORS CORP.

Important: The abrasion sleeve located on the steering column wire harness assembly must be reinstalled. Make note of what connector, in the ignition lock cylinder case, is coming out of the middle of the abrasion sleeve for installation purposes.

2. Remove the steering column tilt head components. Refer to **Tilt Spring Replacement** .
3. Remove the ignition switch. Refer to **IGNITION SWITCH REPLACEMENT** .
4. Remove the 3 pan head tapping screws (1) from the ignition lock cylinder case (2).

   Important: The lock bolt assembly (4) is under slight spring tension from the lock bolt spring (3). Hold the lock bolt (4) in place while removing the ignition lock cylinder case (2).

5. Remove the ignition lock cylinder case (2) and the lock bolt assembly (4) from the steering column tilt head assembly (5).
6. Remove the lock bolt spring (3) from the lock bolt assembly (4).

Installation Procedure

1. Install the lock bolt spring (3) into the steering column tilt head assembly (5).
2. Position the cutout in the lock bolt assembly (4) at the 6 o'clock position.
3. Install the lock bolt assembly (4) into the steering column tilt head assembly (5).
4. Push the lock bolt assembly (4) into the steering column tilt head assembly (5) until the lock bolt assembly (4) is flush with the steering column tilt head assembly (5).
5. Align the ignition lock cylinder case (2) with the steering column tilt head assembly (5).

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

6. Screw the 3 pan head tapping screws (1) into the ignition lock cylinder case (2).

   Tighten

   Tighten the 3 screws to 7 N.m (62 lb in).
7. Install the ignition switch. Refer to **IGNITION SWITCH REPLACEMENT** .

   Important: The abrasion sleeve must be installed back onto the steering column wire harness assembly. The ignition lock cylinder case wires and connector must be hanging out of the middle of the abrasion sleeve.

8. Install the steering column tilt head components. Refer to **Tilt Spring Replacement** .
9. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

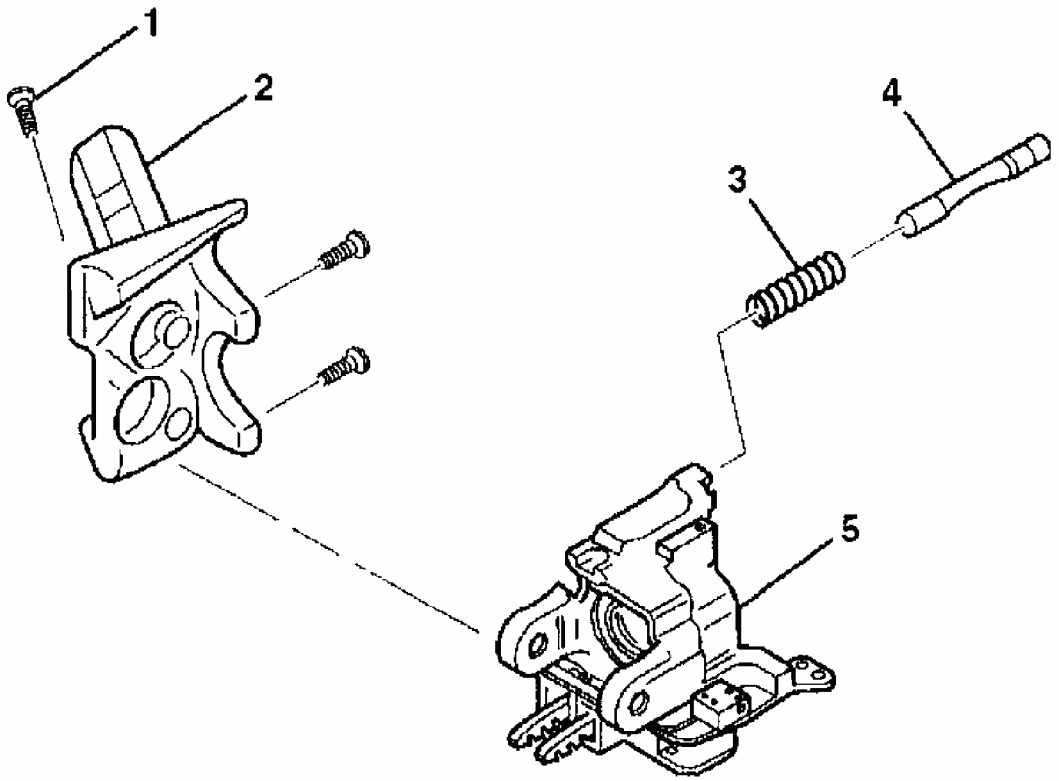

Fig. 53: Ignition Lock Cylinder Case (Floor Shift)
Courtesy of GENERAL MOTORS CORP.

IGNITION LOCK CYLINDER CASE REPLACEMENT (COLUMN SHIFT)

Tools Required

- *J 23653-SIR* Steering Column Lock Plate Compressor
- *J 42759* Ignition Switch Connector Release Tool
- *J 42137* Cam Orientation Plate Adapter

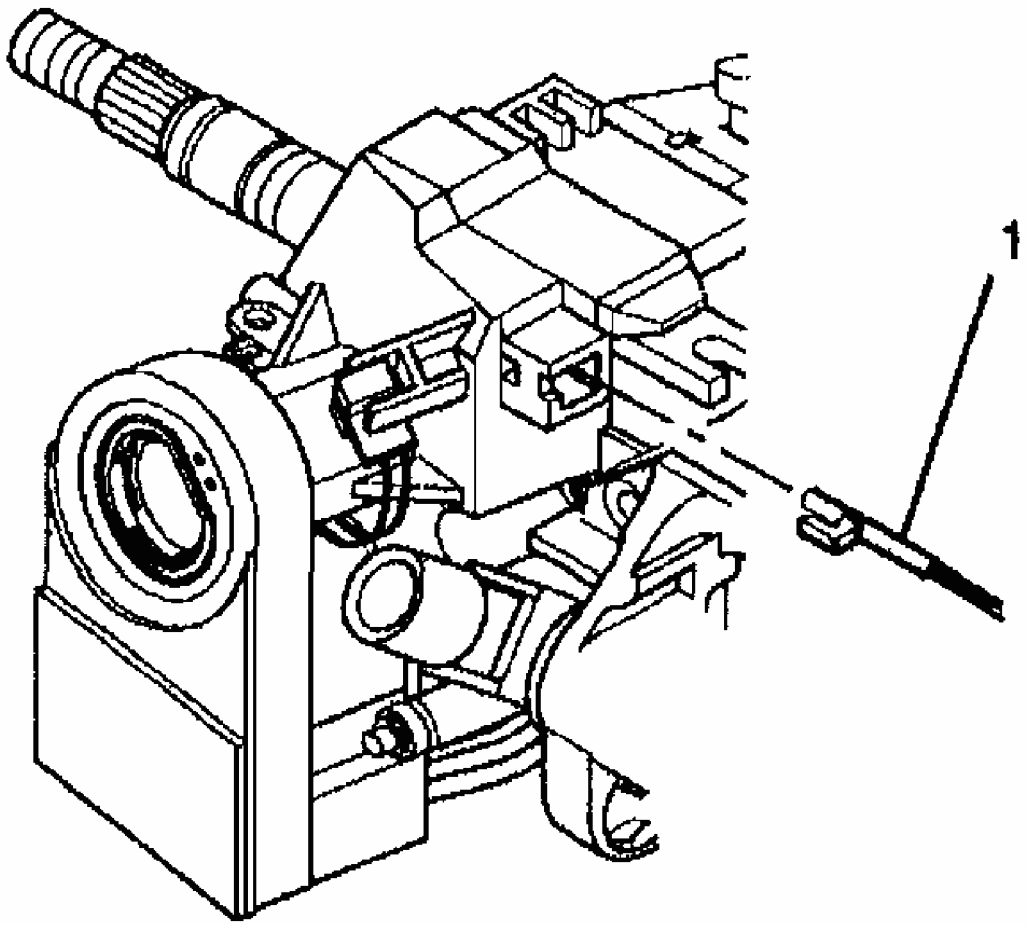

Fig. 54: Removing Park Lock Cable Assembly From Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

   Important: The abrasion sleeve located on the steering column wire harness assembly must be reinstalled. Make note of what connector, ignition lock cylinder case, is coming out of the middle of the abrasion sleeve for installation purposes.

2. Remove the steering column tilt head assembly. Refer to **Tilt Spring Replacement** .
3. Remove the ignition switch. Refer to **IGNITION SWITCH REPLACEMENT** .
4. Remove the park lock cable assembly (1) from the ignition lock cylinder case in the following way:
    4.1. Place the steering column lock cylinder set into the OFF position.
    4.2. Place the shift lever clevis into the PARK position.
    4.3. Use a small blade to push against the locking tab on the end of the park lock cable assembly (1).
    4.4. Disconnect the park lock cable assembly (1) from the ignition lock cylinder case.
5. Remove the 3 TORX(R) screws (2) from the ignition lock cylinder case (1).
6. Remove the ignition lock cylinder case (1) from the steering column tilt head assembly.

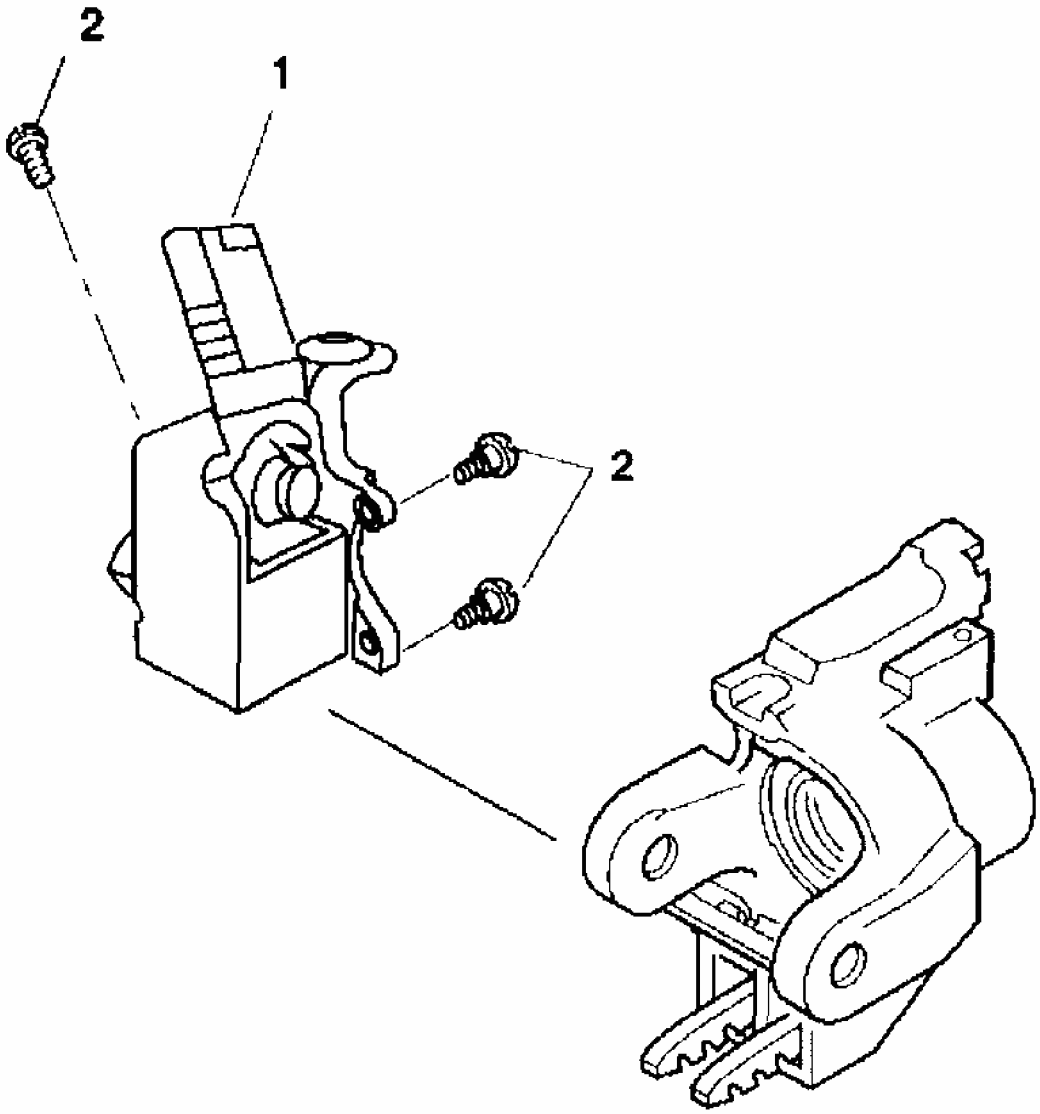

Fig. 55: Removing Ignition Lock Cylinder Case From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Align the ignition lock cylinder case (1) with the steering column tilt head assembly.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Screw the 3 TORX(R) screws (2) into the ignition lock cylinder case (1).

Tighten

Tighten the screws to 7 N.m (62 lb in).

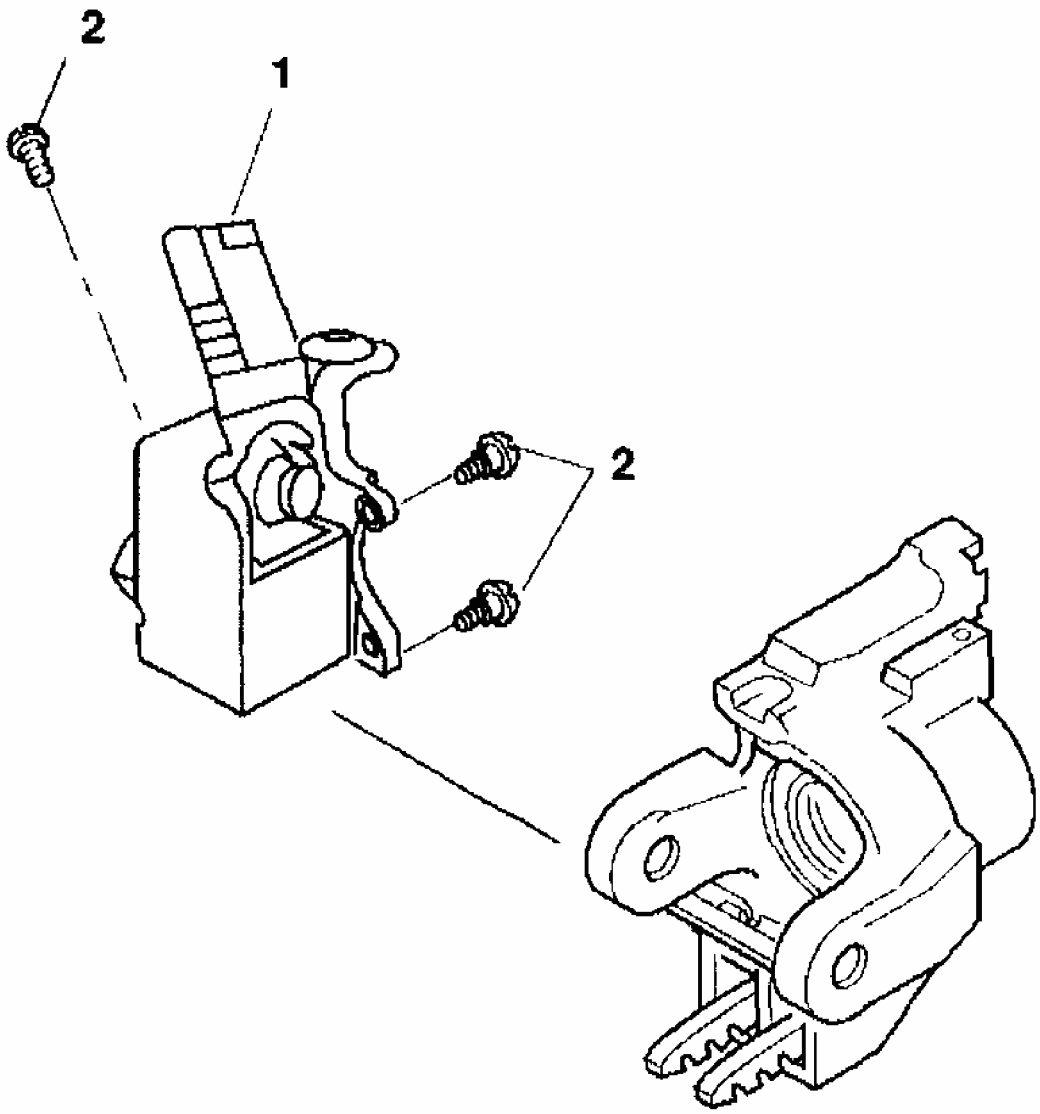

Fig. 56: Installing Ignition Lock Cylinder Case Into Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

3. Place steering column lock cylinder set into the OFF position.
4. Place the shift lever clevis into the PARK position.
5. Press the locking tab on the end of the park lock cable assembly (1) into the slot in the

ignition lock cylinder case.

6. Install the ignition switch. Refer to **IGNITION SWITCH REPLACEMENT** .

   Important: The abrasion sleeve must be installed back onto the steering column wire harness assembly. The ignition lock cylinder case wires and connector must be hanging out of the middle of the abrasion sleeve.

7. Install the steering column tilt head assembly. Refer to **Tilt Spring Replacement** .
8. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

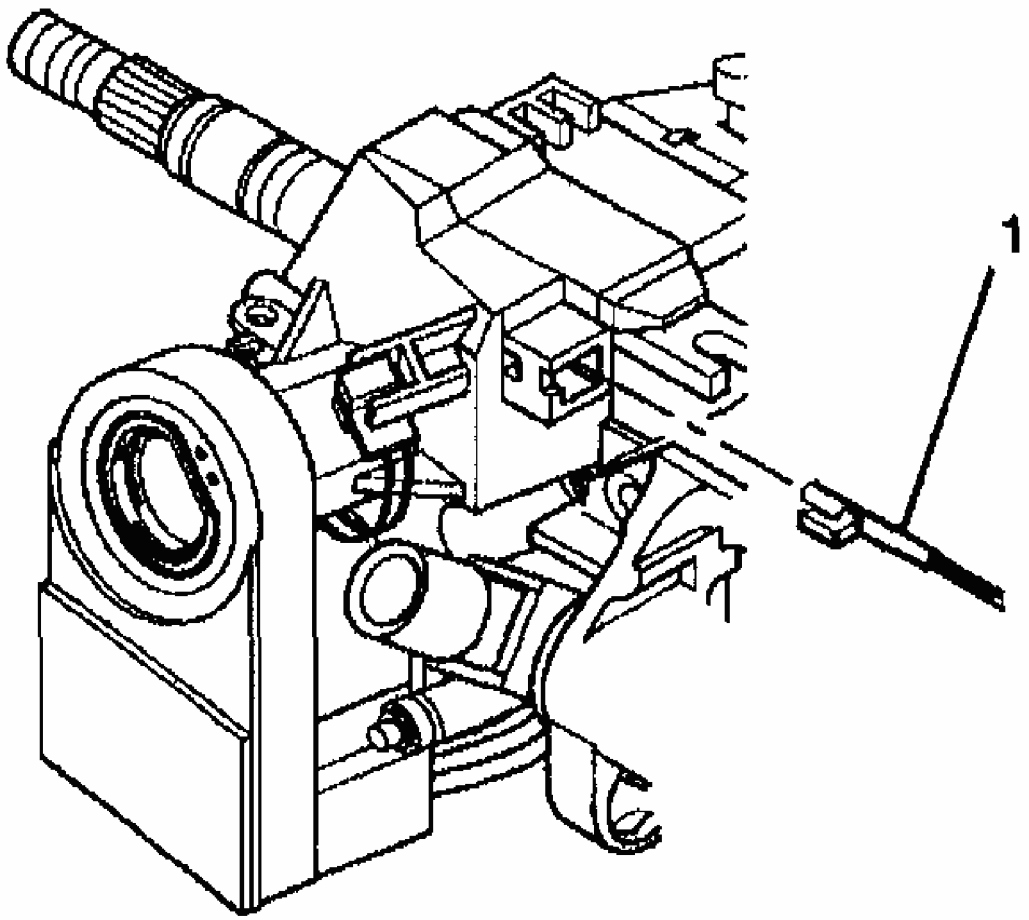

Fig. 57: Installing Locking Tab Into Slot In Ignition Lock Cylinder Case
Courtesy of GENERAL MOTORS CORP.

MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .

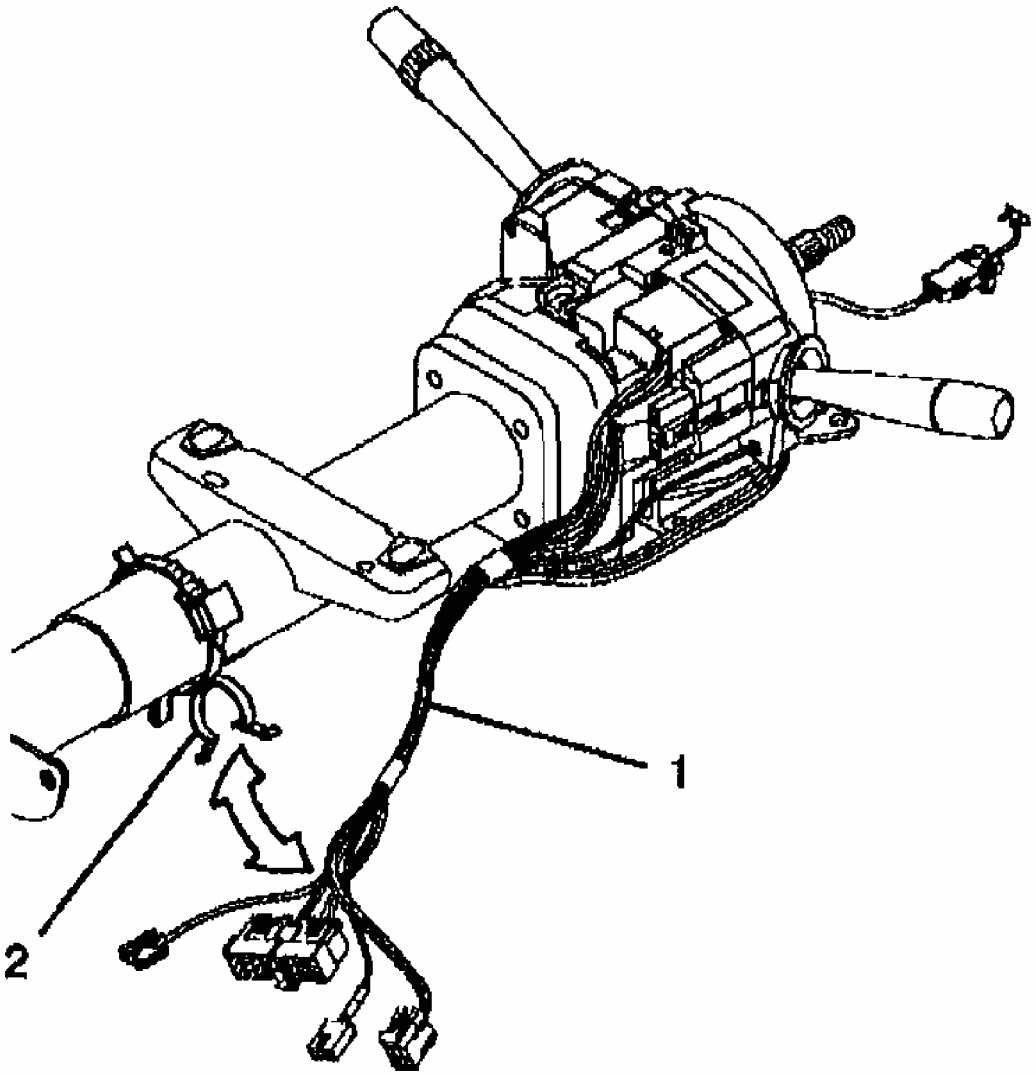

Fig. 58: Turn Signal Switch

Courtesy of GENERAL MOTORS CORP.

Important: The abrasion sleeve located on the steering column wire harness assembly must be reinstalled. Make note of what connector is coming out of the abrasion sleeve for installation purposes.

3. Remove the wire harness assembly (1) from the wire harness strap (2).
4. Disconnect the turn signal and multifunction switch assembly connector from the SIR system coil connector.
5. Slide the 2 connectors (2) of the turn signal and multifunction switch assembly out of the bulkhead connector (1).

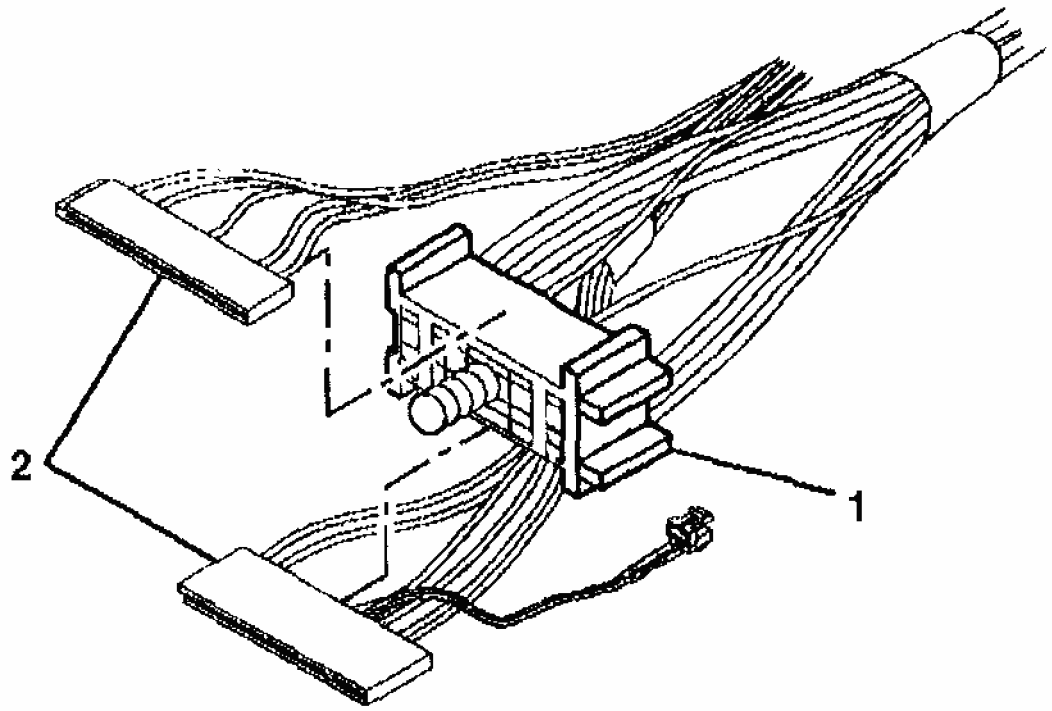

Fig. 59: Sliding Connectors Of Turn Signal & Multifunction Switch Assembly Out Of Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

6. Remove the 2 pan head tapping screws (1) and (3) from the turn signal and multifunction switch assembly (2).
7. Remove the turn signal and multifunction switch assembly (2) from the steering column tilt head assembly.

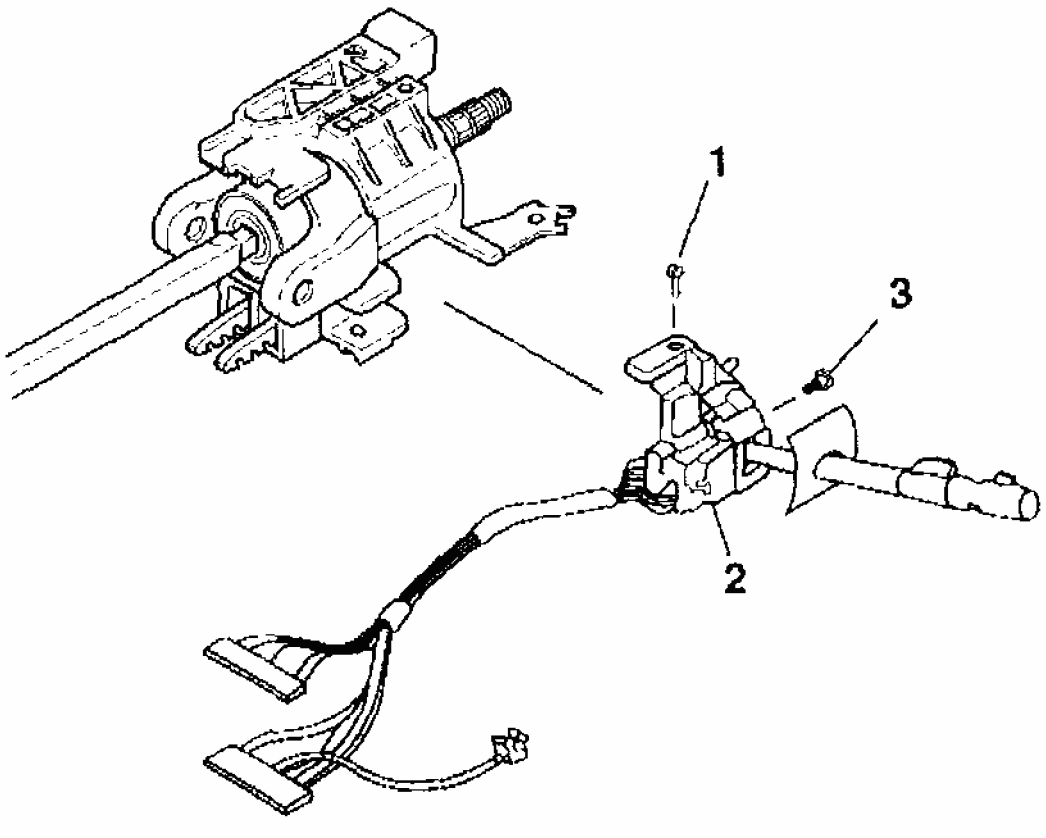

Fig. 60: Removing Turn Signal & Multifunction Switch Assembly From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the turn signal and multifunction switch assembly (2) onto the steering column tilt head assembly.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

Important: Be sure that the electrical contact of the turn signal and multifunction switch assembly (2) rests on the turn signal cancel cam assembly.

2. Screw the 2 pan head tapping screws (1) and (3) into the turn signal and multifunction assembly (2).

Tighten

- Tighten the top pan head tapping screw (1) to 3 N.m (30 lb in).
- Tighten the side pan head tapping screw (3) to 7 N.m (62 lb in).

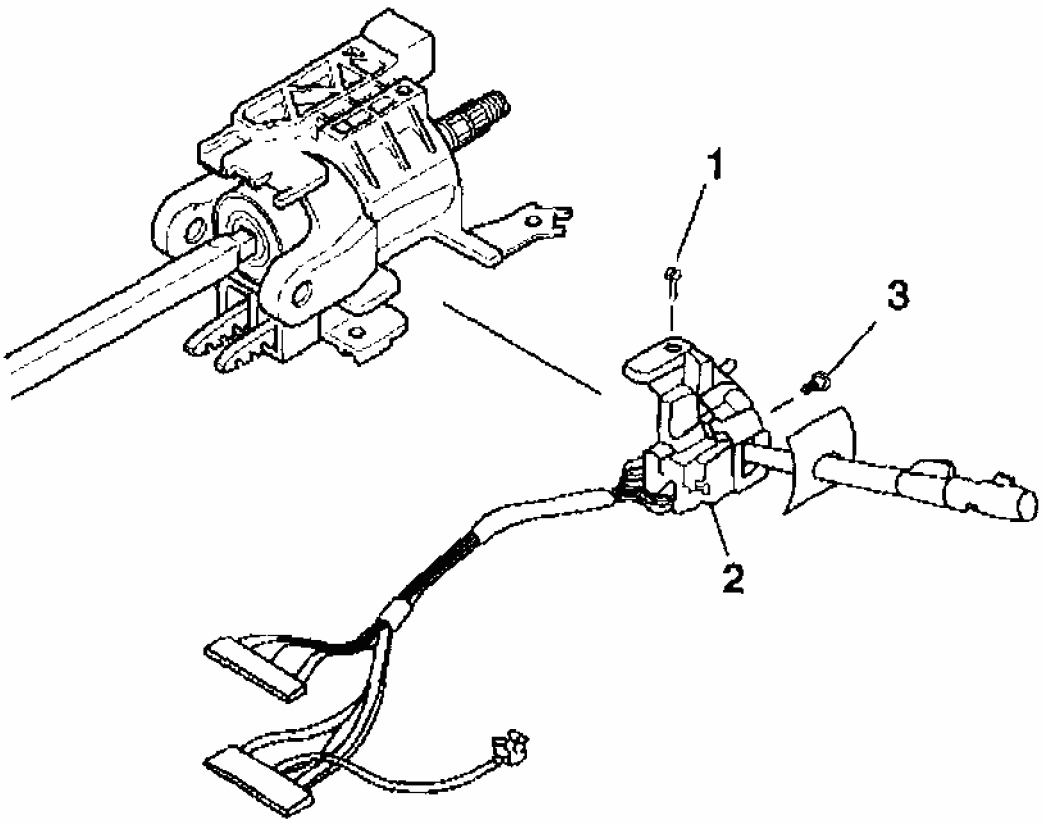

Fig. 61: Installing Turn Signal & Multifunction Switch Assembly From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

3. Slide the 2 connectors (2) of the turn signal and multifunction switch assembly into the bulkhead connector (1).

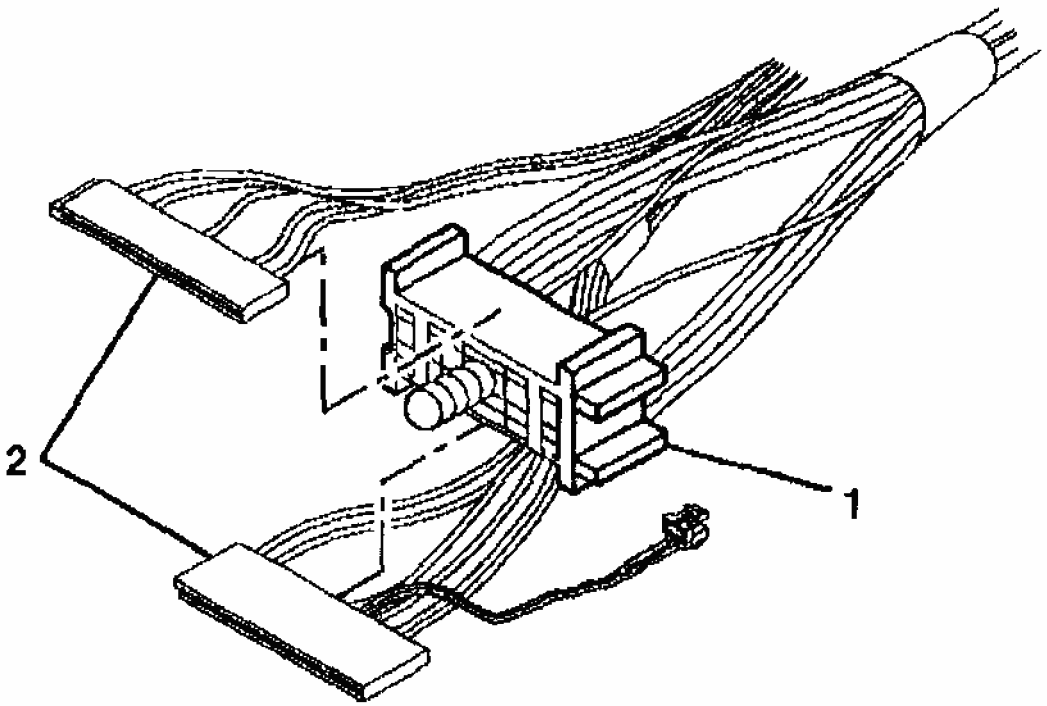

Fig. 62: Installing Connectors Of Turn Signal & Multifunction Switch Assembly Into Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

4. Connect the turn signal and multifunction switch assembly connector to the SIR coil connector.

   Important: The abrasion sleeve must be installed back onto the steering column wire harness assembly. The ignition lock cylinder case wires and connector must be hanging out of the middle of the abrasion sleeve.

5. Install the wire harness assembly (1) into the wire harness strap (2).
6. Install the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
7. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

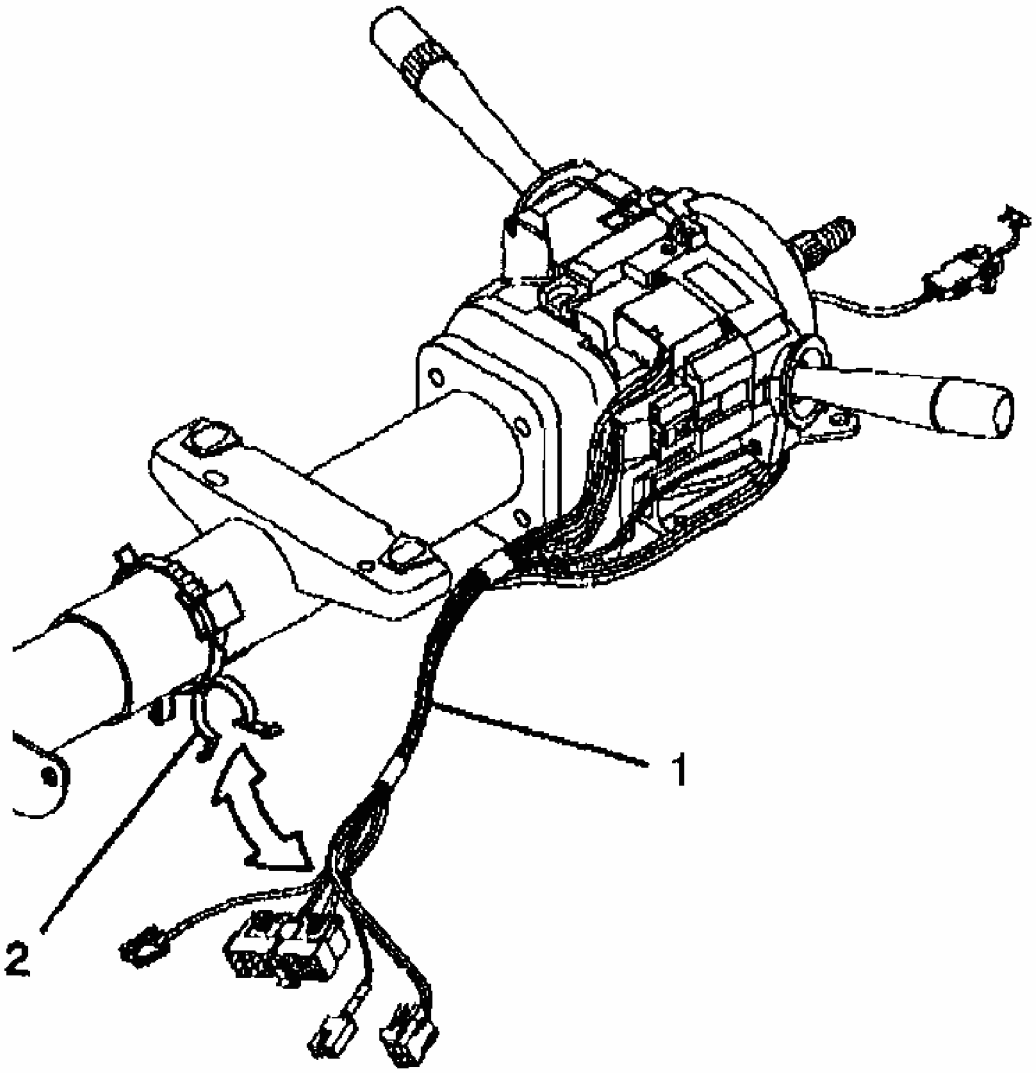

Fig. 63: Installing Wire Harness Assembly Into Wire Harness Strap
Courtesy of GENERAL MOTORS CORP.

SHIFT LEVER REPLACEMENT

Removal Procedure

1. Pull the shift lever seal away from the upper steering column trim cover.
2. Remove the screw (2) that retains the shift lever to the steering column.
3. Remove the shift lever (1) from the steering column.

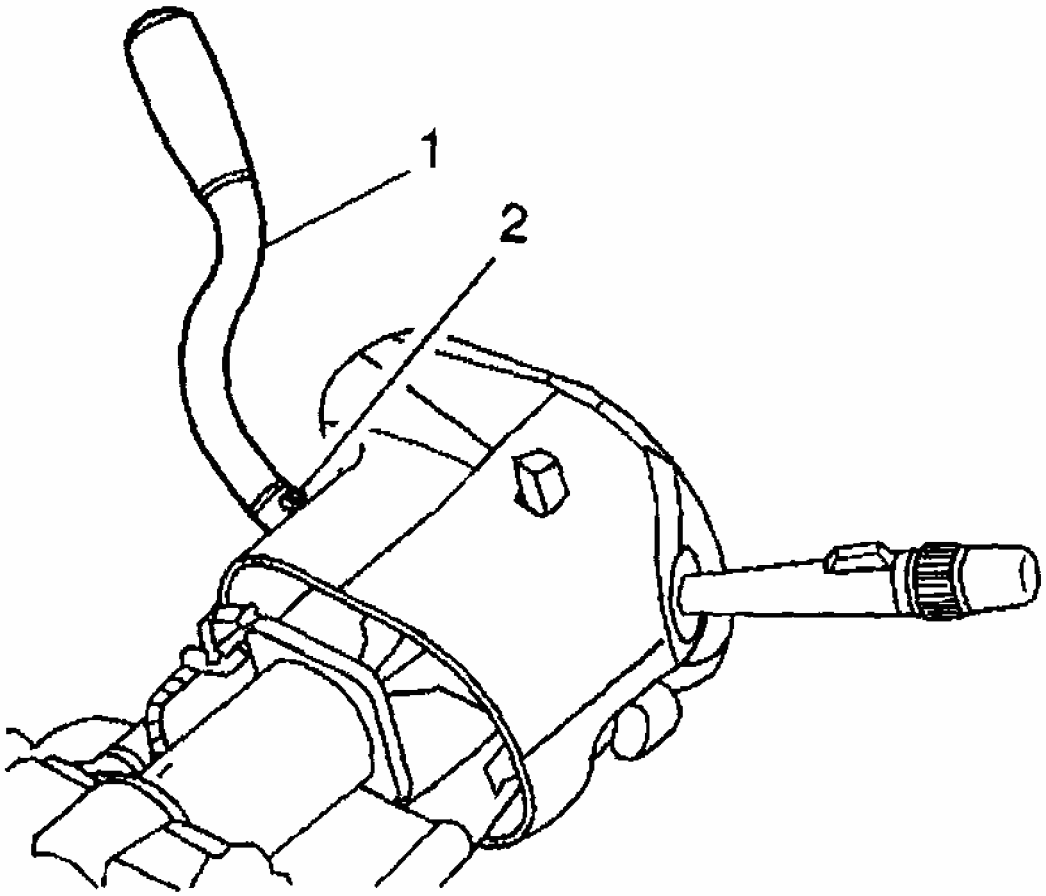

Fig. 64: Removing Shift Lever From Steering Column
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the shift lever (1) to the steering column.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the screw (2) that retains the shift lever to the steering column.

Tighten

Tighten the screw to 22 N.m (16 lb ft).

3. Install the shift lever seal to the upper steering column trim cover.

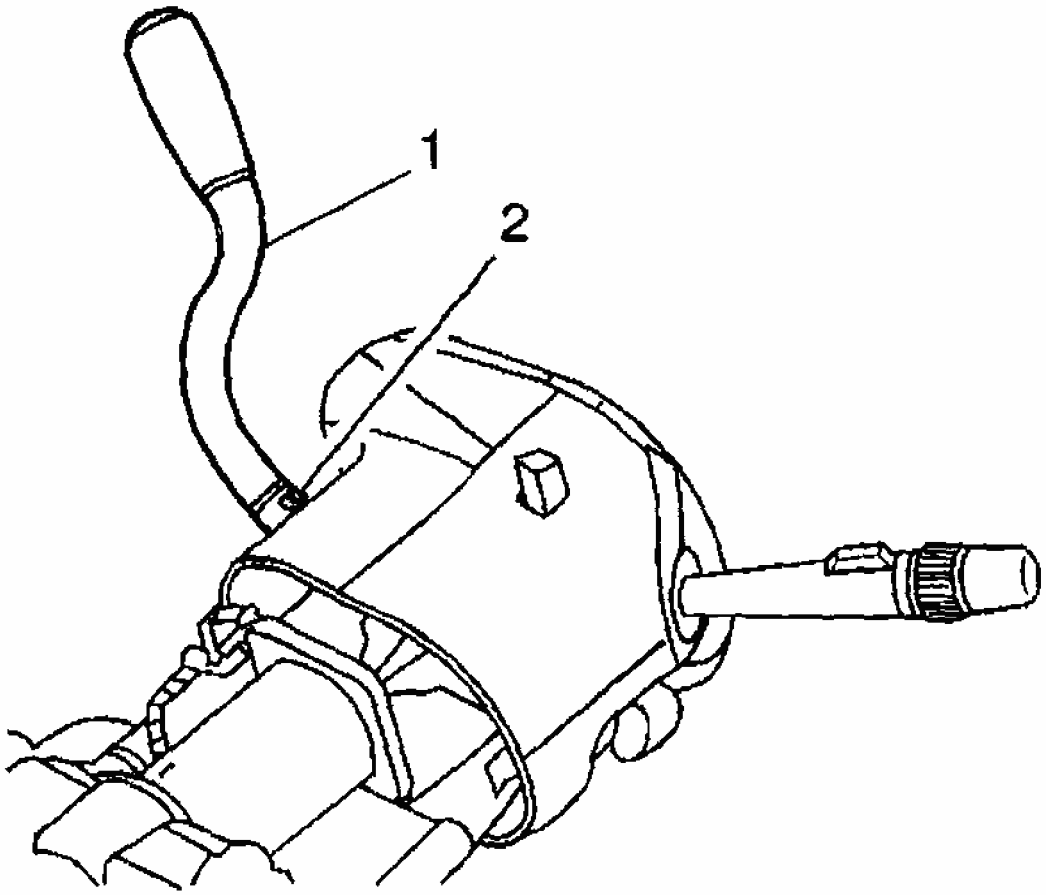

Fig. 65: Installing Shift Lever To Steering Column
Courtesy of GENERAL MOTORS CORP.

LINEAR SHIFT ASSEMBLY REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** .
2. Remove the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
3. Remove the shift lever assembly. Refer to **SHIFT LEVER REPLACEMENT** .
4. With a screwdriver carefully pry the automatic transmission shift lock control away

from the steering column jacket.

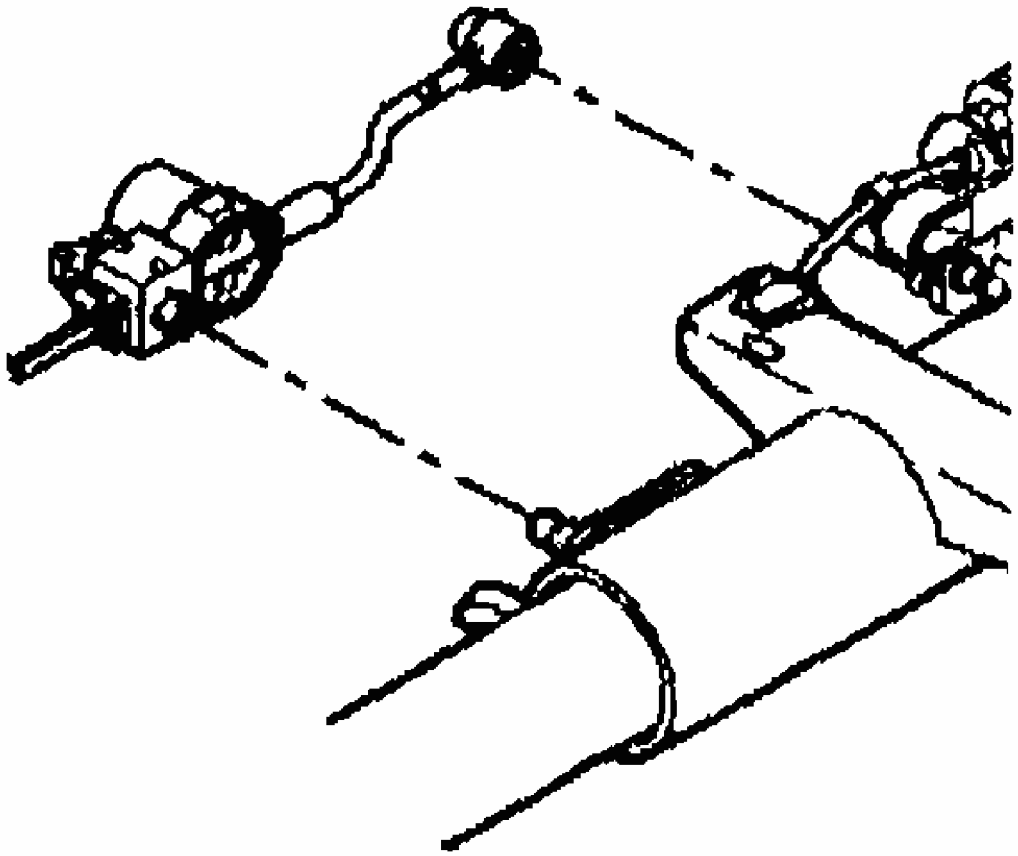

Fig. 66: Removing Automatic Transmission Shift Lock Control Away From Steering Column Jacket
Courtesy of GENERAL MOTORS CORP.

5. The lock cylinder should be in the OFF-LOCK position.

   Important: Do not remove the tape on the park lock cable. If so, the linear shift assembly must be replaced.

6. Insert a small screwdriver into the slot on the ignition lock cylinder case and push against the locking tab to remove the park lock cable assembly (1).

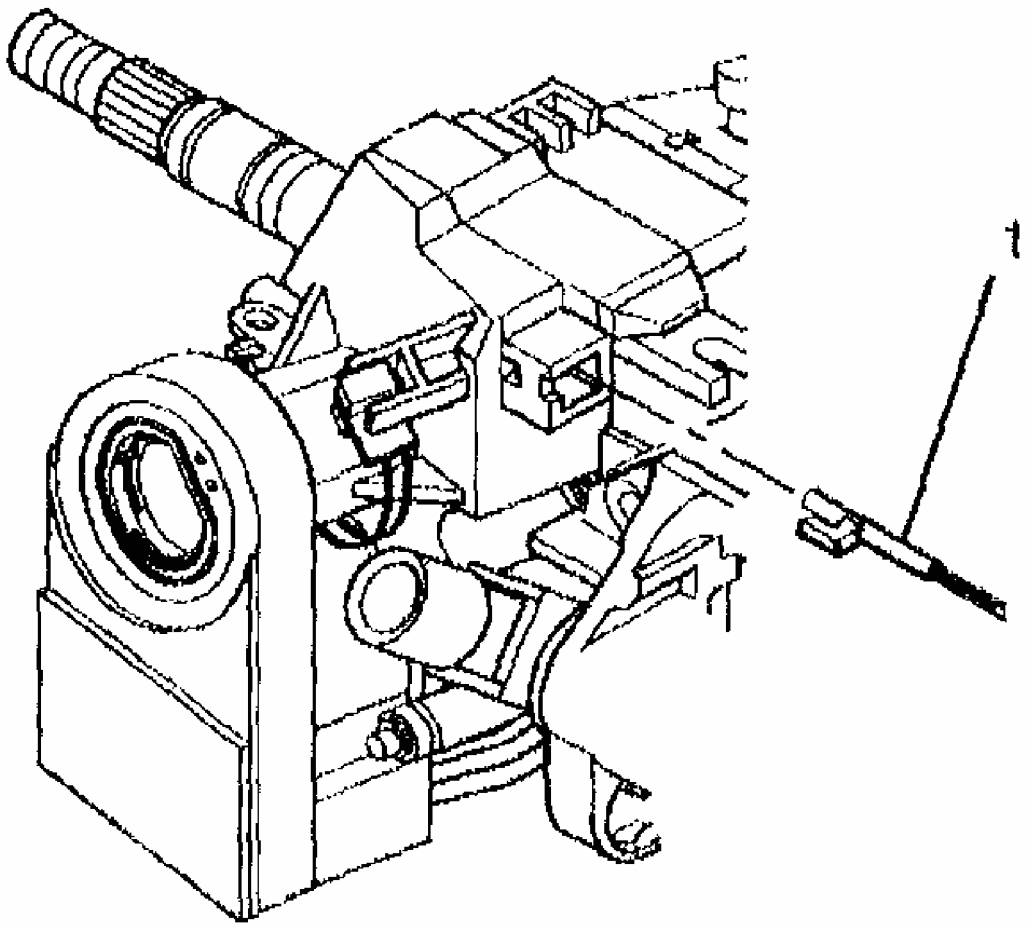

Fig. 67: Park Lock Cable Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the 3 flat head 6 lobed socket tap screws from the linear shift assembly.
8. Remove the linear shift assembly.

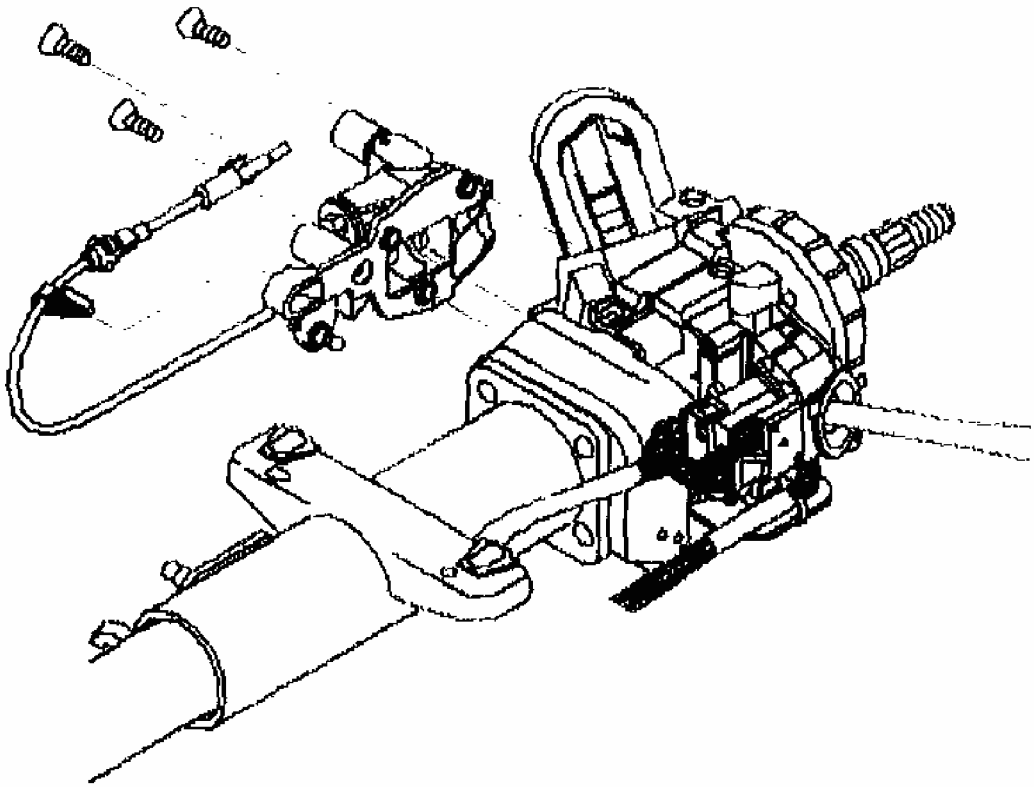

Fig. 68: Removing Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

Important: Do not remove the tape on the park lock cable. If so, the linear shift assembly must be replaced.

1. Install the linear shift assembly and secure by using 3 flat head 6-lobed socket tap screws.

   The linear shift assembly must be out of the PARK position to install the lower socket tap screw.

   Tighten

   Tighten the screws to 10 N.m (89 lb in).

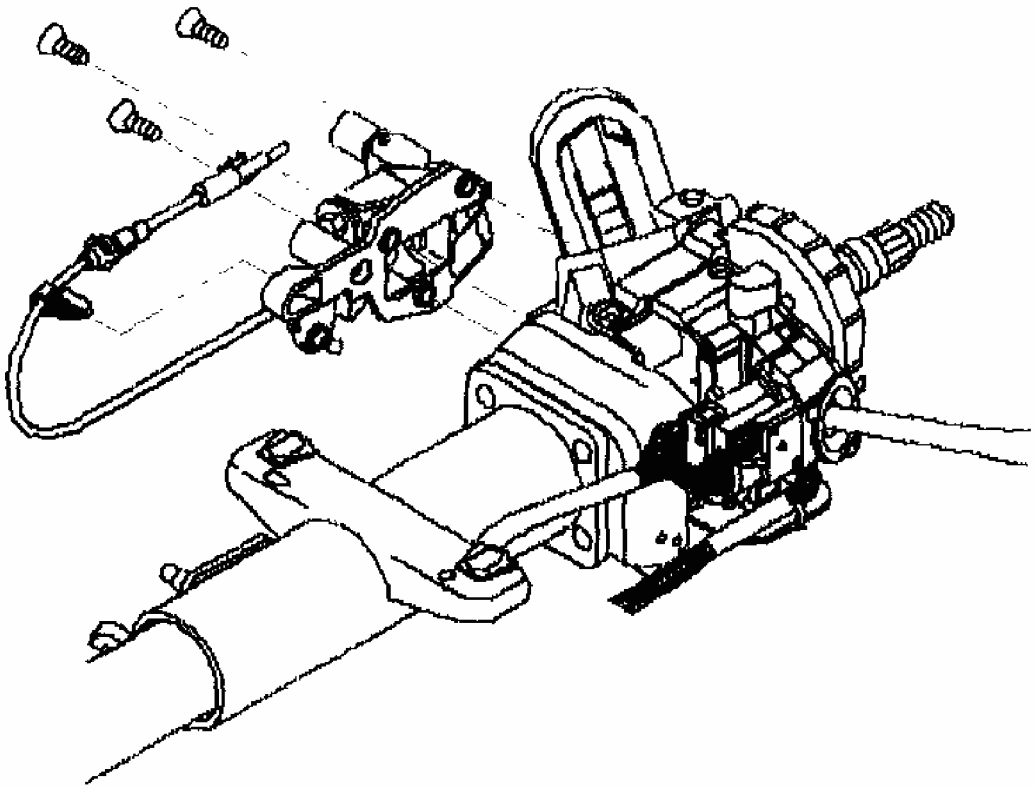

Fig. 69: Linear Shift Assembly
Courtesy of GENERAL MOTORS CORP.

2. Connect the park lock cable assembly (1) into the ignition lock cylinder case.
   - The lock cylinder should be in the OFF-LOCK position.
   - The locking tab at the end of the park lock cable assembly (1) must be installed into the ignition lock cylinder case.

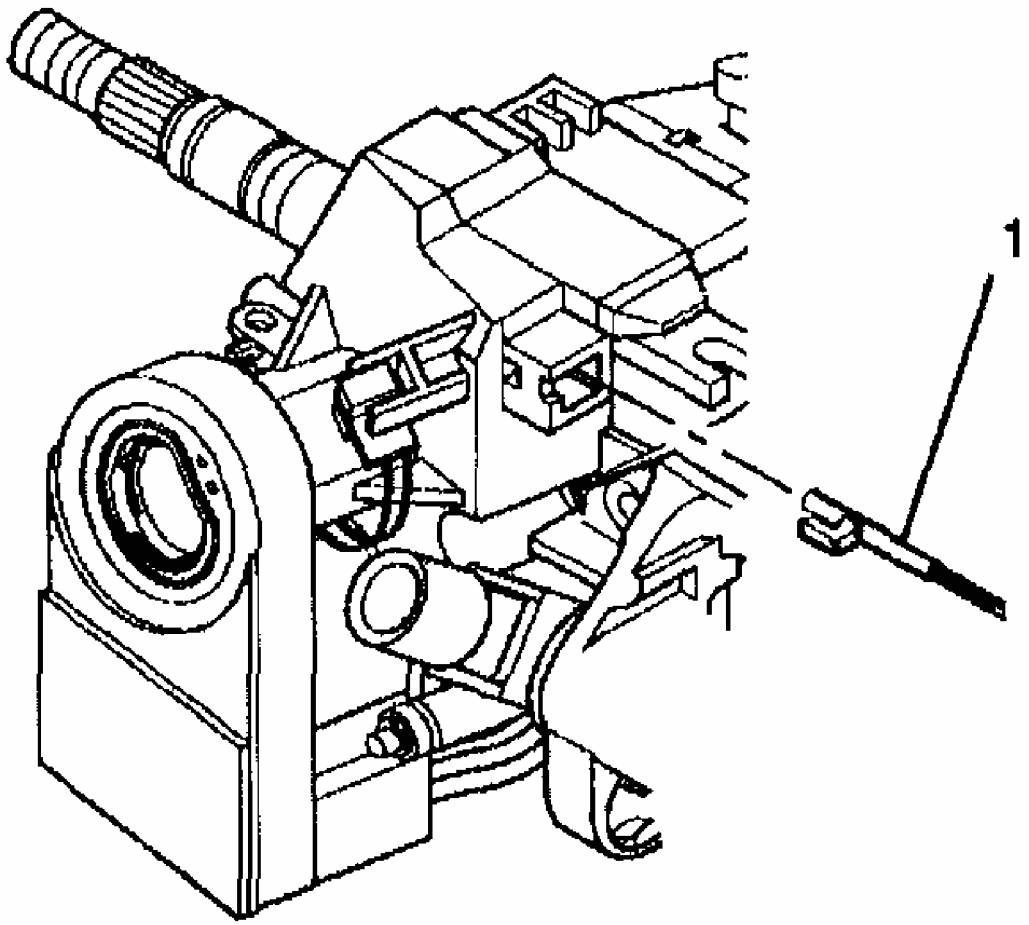

Fig. 70: Locking Tab
Courtesy of GENERAL MOTORS CORP.

3. Install the automatic transmission shift lock control.

   Install the gear shift lever and put the column in the NEUTRAL position.

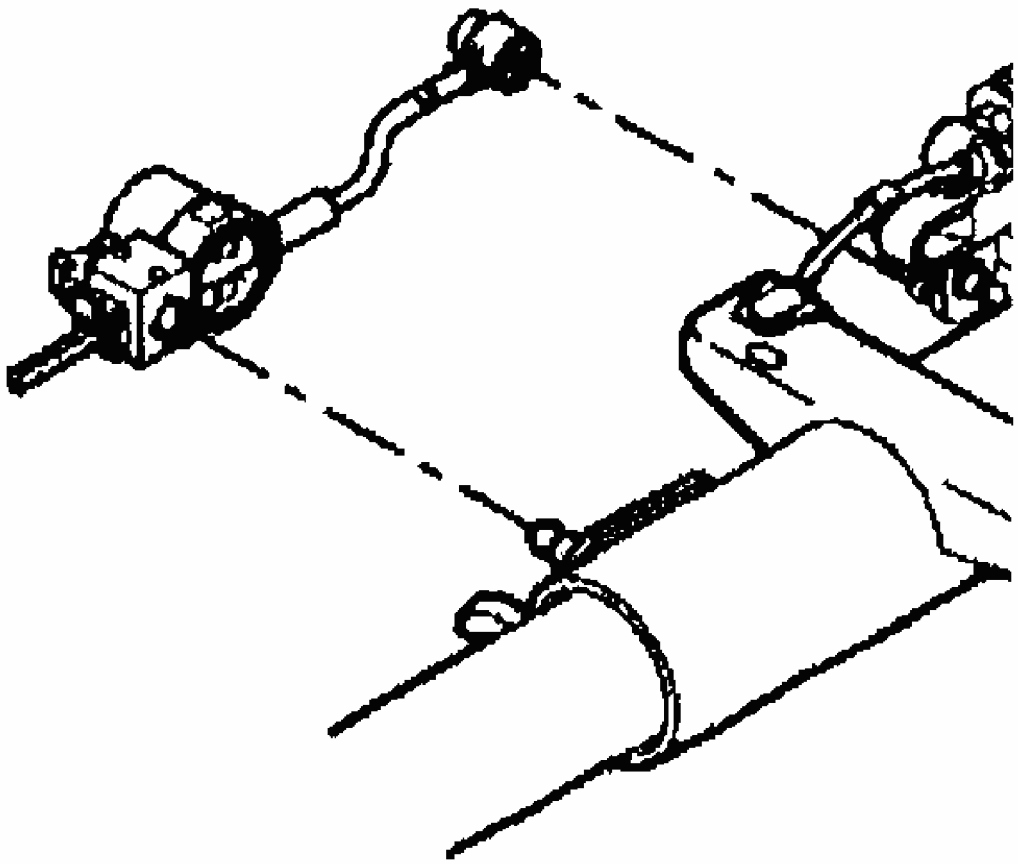

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Fig. 71: Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

4. Adjust the automatic transmission shift lock control.
   4.1. Pull the tab (1) out on the block side (2) of the automatic transmission shift lock control.
   4.2. Press on the adjuster block (2) to compress the internal adjuster spring to disengage the adjuster teeth. Slide the adjuster block as far away from the solenoid as possible.
   4.3. Lock in place by pushing the tab (1) back in.
5. Inspect the automatic transmission shift lock control.
   5.1. The automatic transmission shift lock control must lock the gear shift lever when it is put into the PARK position.

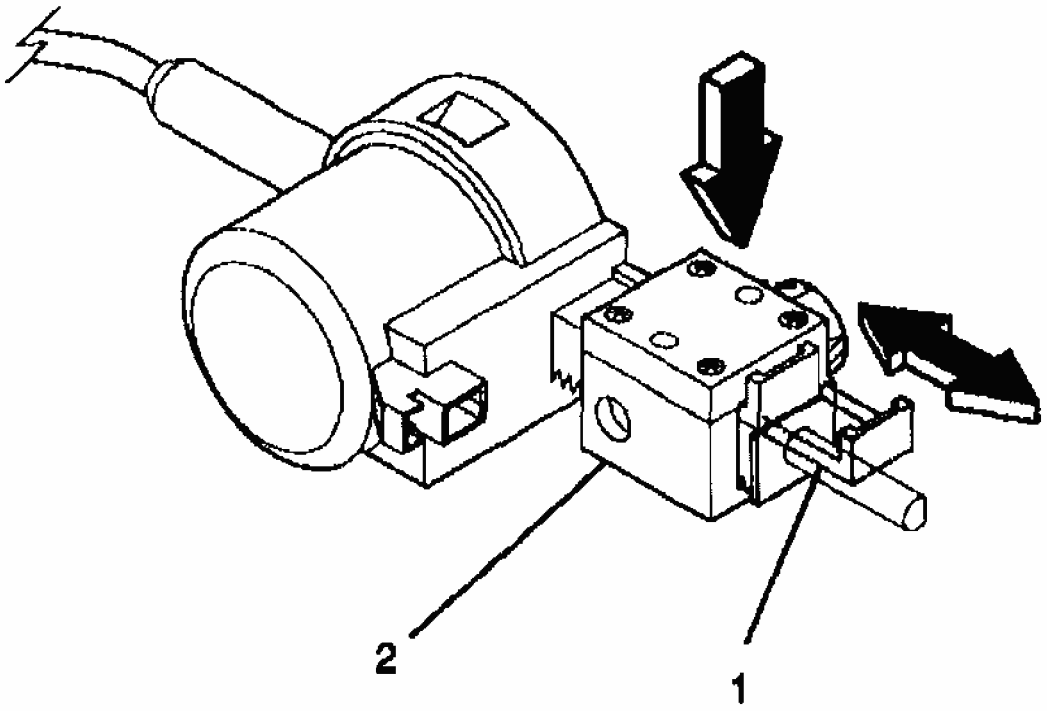

Fig. 72: Adjusting Automatic Transmission Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

5.2. When the column is installed in the vehicle you will not be able to shift the gear shift lever out of the PARK position without pressing on the brake pedal. The solenoid will be energized.

5.3. Readjust if needed.

6. Install the shift lever assembly. Refer to **SHIFT LEVER REPLACEMENT** .
7. Install the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .
8. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** .

TILT LEVER REPLACEMENT

Removal Procedure

Pull the lever out of the steering column.

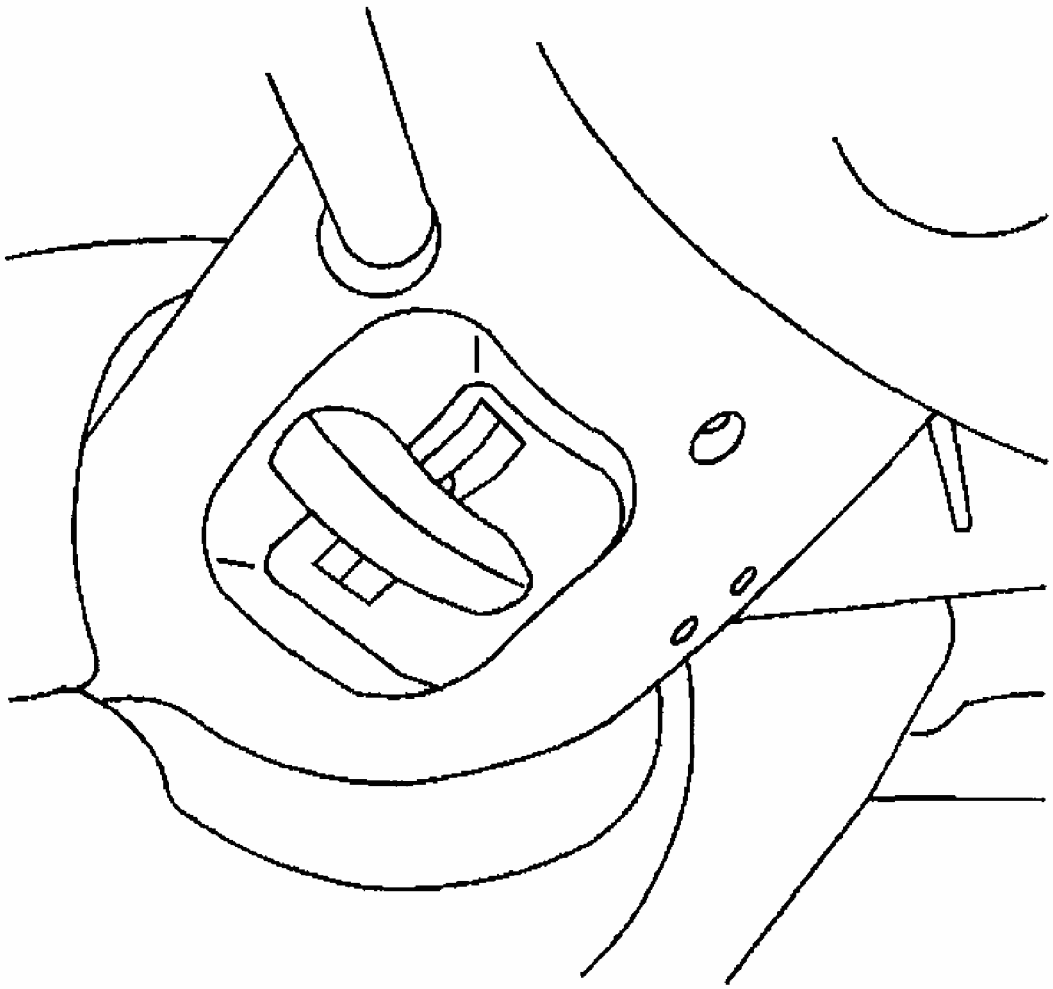

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Fig. 73: Removing Tilt Lever From Steering Column
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Align the lever in the steering column.
2. Push the lever into the steering column.

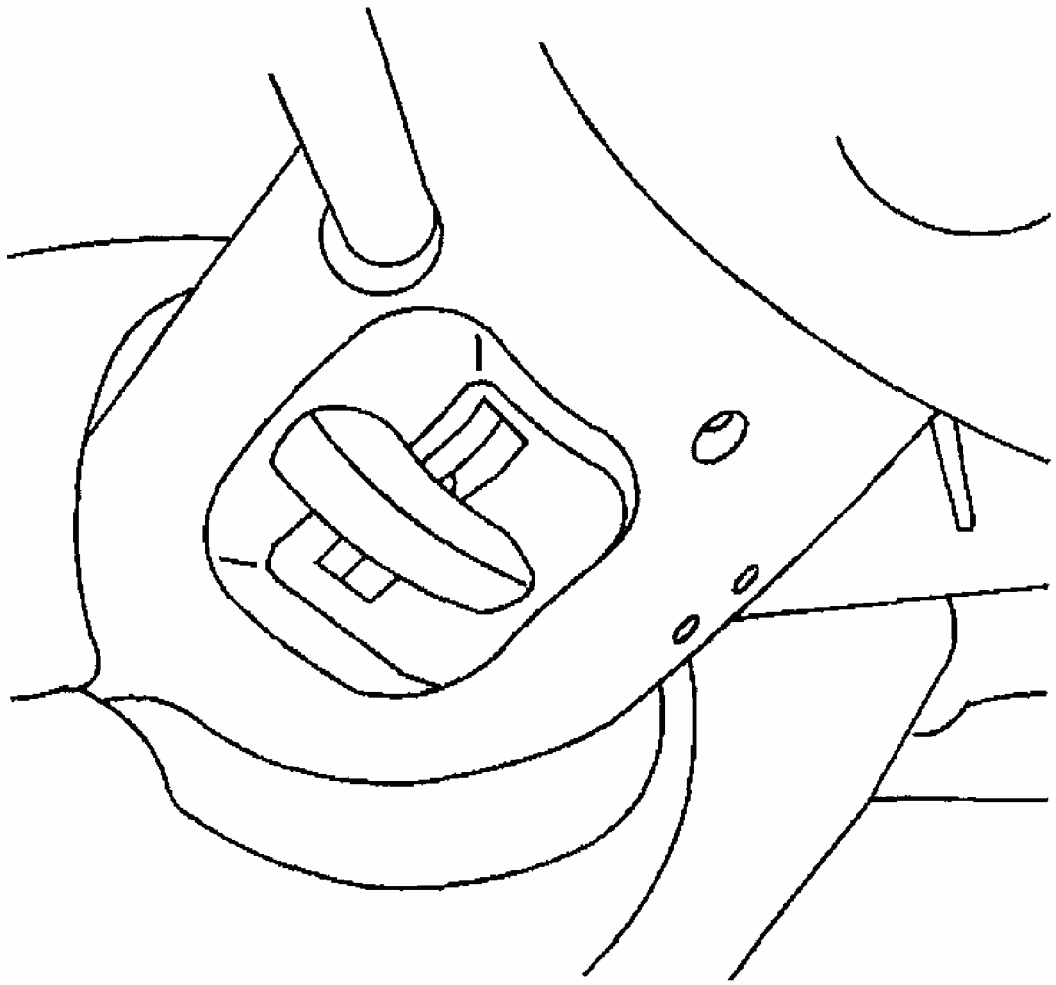

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Fig. 74: Installing Tilt Lever Into Steering Column
Courtesy of GENERAL MOTORS CORP.

HORN SWITCH REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the inflator module. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE REPLACEMENT in SIR.
3. Remove the horn plunger from the steering column by pressing inward to the stop and

rotating the horn plunger 90 degrees.

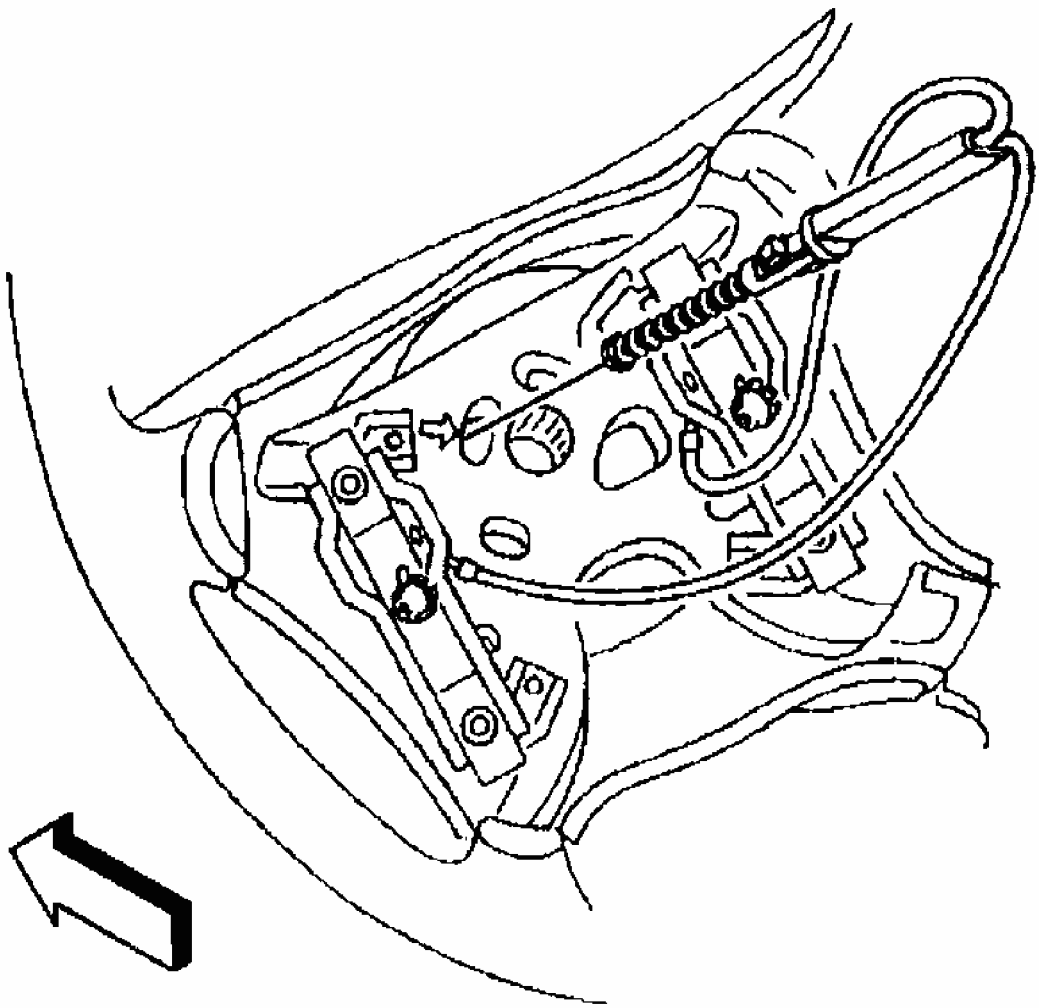

Fig. 75: Removing Horn Plunger From Steering Column
Courtesy of GENERAL MOTORS CORP.

4. Remove the screws which retain the horn contact plate to the steering wheel.
5. Remove the horn plunger from the steering wheel.

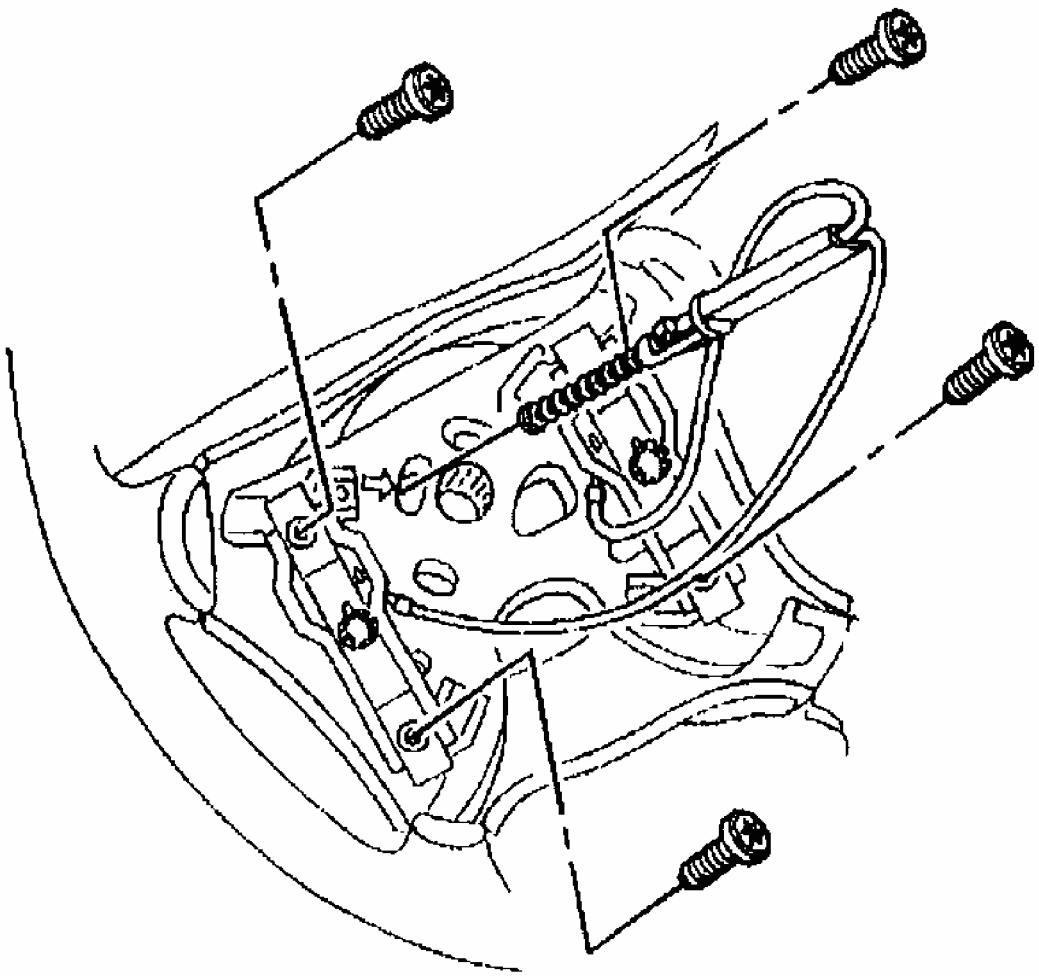

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Fig. 76: Removing Screws Which Retain Horn Contact Plate To Steering Wheel
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the horn plunger to the steering wheel.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the screws which retain the horn contact plate to the steering wheel.

Tighten

Tighten the screws to 5.5 N.m (50 lb in).

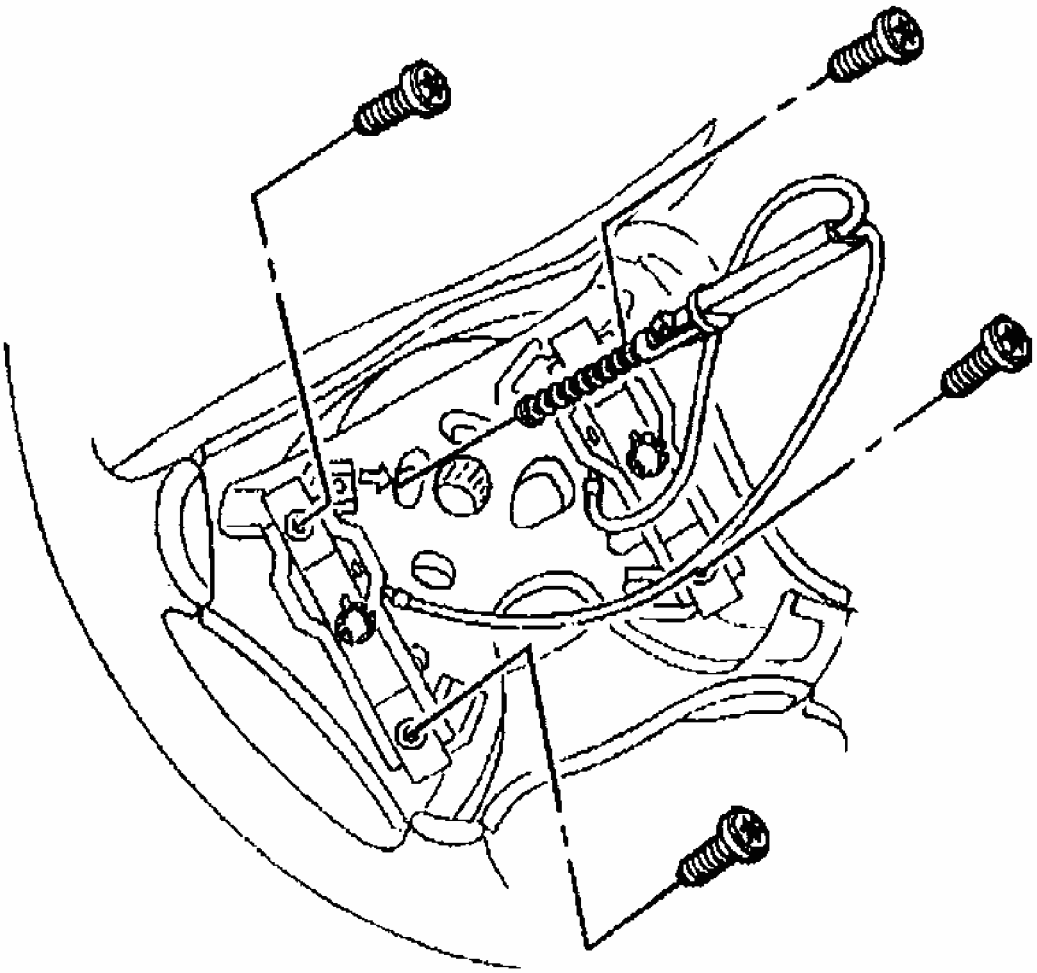

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Fig. 77: Installing Screws Which Retain Horn Contact Plate To Steering Wheel
Courtesy of GENERAL MOTORS CORP.

3. Install the horn plunger to the steering column.
4. Install the inflator module. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE REPLACEMENT in SIR.
5. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

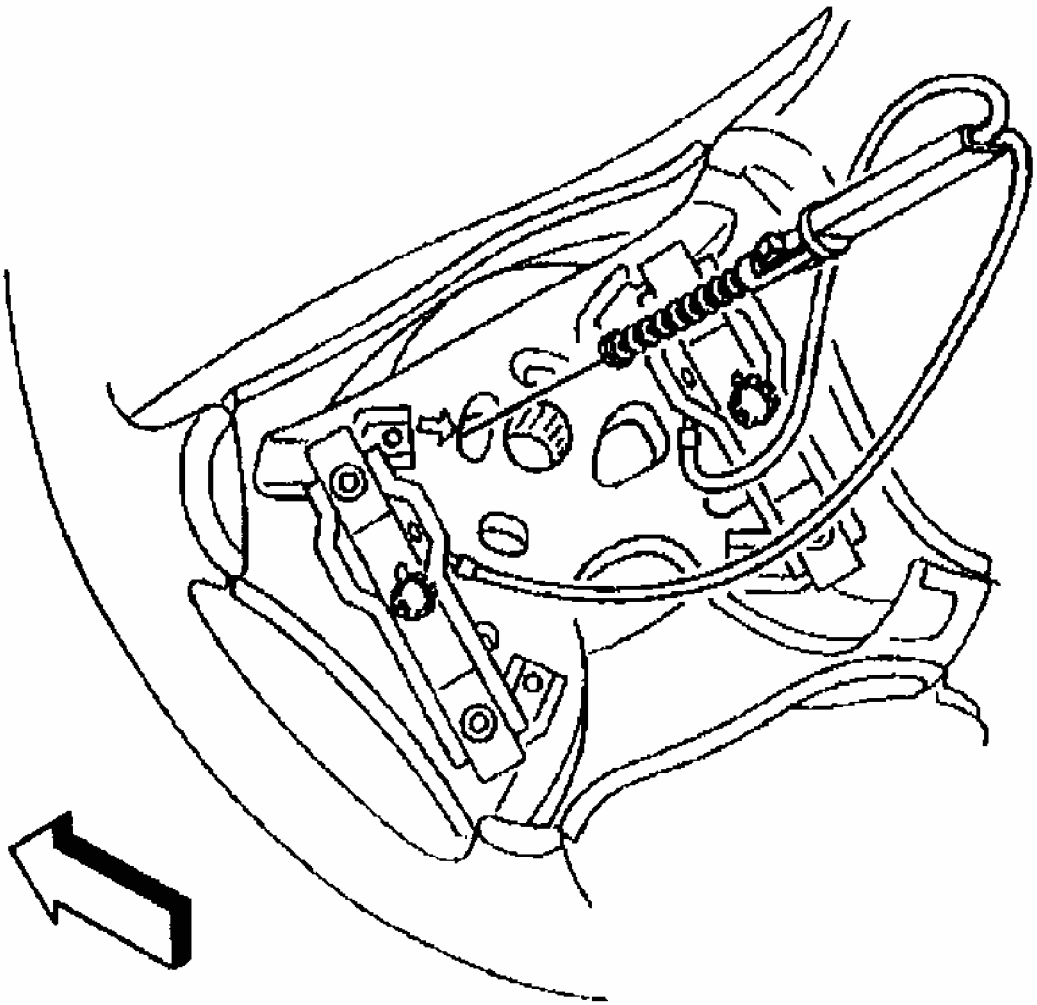

Fig. 78: Installing Horn Plunger To Steering Column
Courtesy of GENERAL MOTORS CORP.

STEERING WHEEL REPLACEMENT

Tools Required

J 1859-A Steering Wheel Puller

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the inflator module. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE REPLACEMENT in SIR.
3. Remove the horn plunger from the steering column by pressing inward to the stop and rotating the horn plunger 90 degrees.

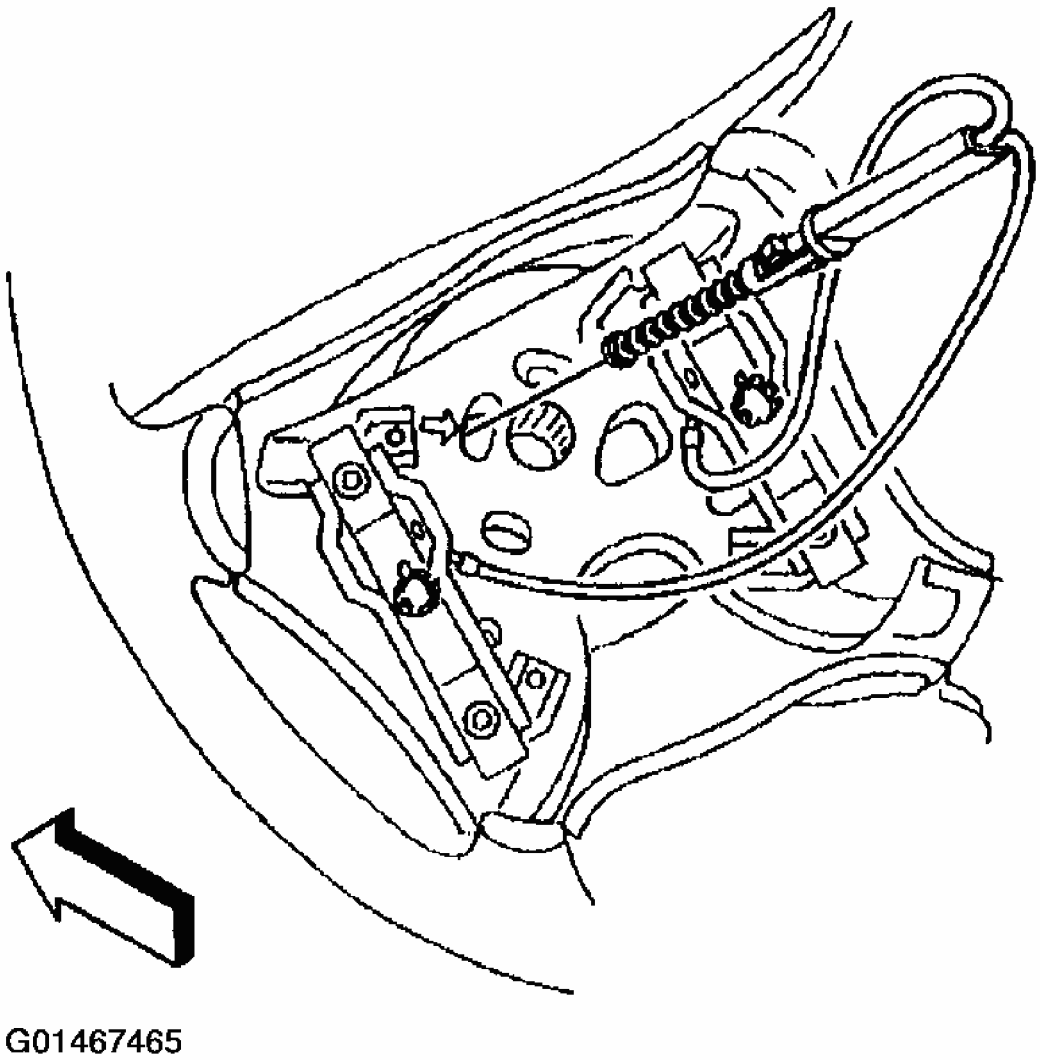

Fig. 79: Removing Horn Plunger From Steering Column
Courtesy of GENERAL MOTORS CORP.

4. On vehicles with redundant steering wheel controls, disconnect the steering wheel electrical connector.

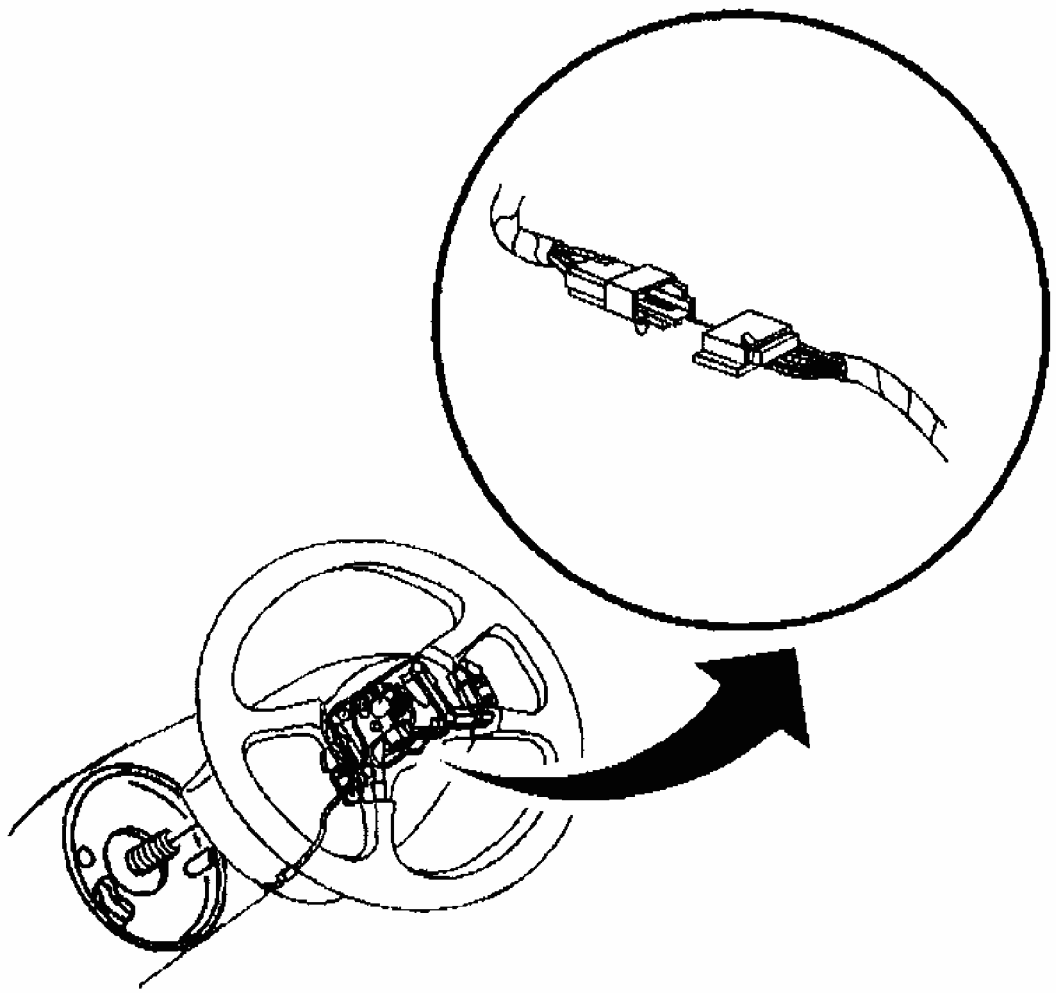

Fig. 80: Disconnecting Steering Wheel Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Remove the nut that retains the steering wheel to the steering shaft.
6. Mark the steering wheel to the steering shaft.

   This will ensure proper alignment during installation.

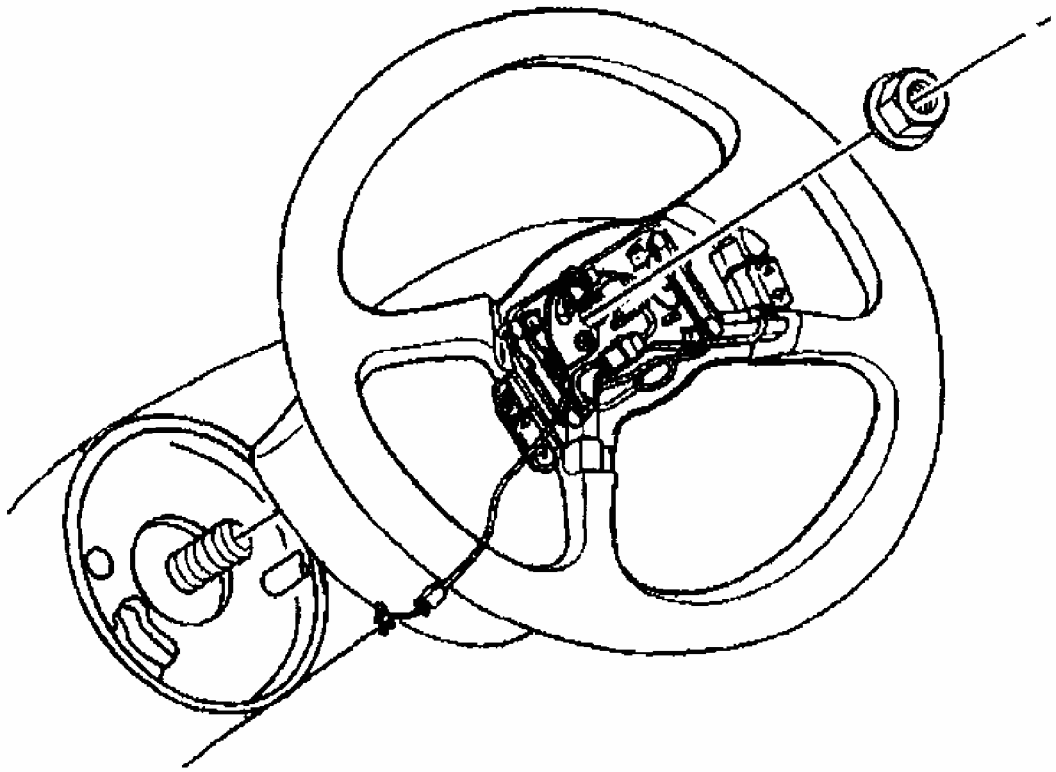

Fig. 81: Removing Nut That Retains Steering Wheel To Steering Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: When removing the steering wheel, use only the specified steering wheel puller. Do not hammer on the end of the steering column shaft. Hammering could loosen the plastic injections which maintain the steering column rigidity.

7. Install *J 1859-A* to the steering wheel.
8. Remove the steering wheel using *J 1859-A* .
9. Remove the *J 1859-A* from the steering wheel.

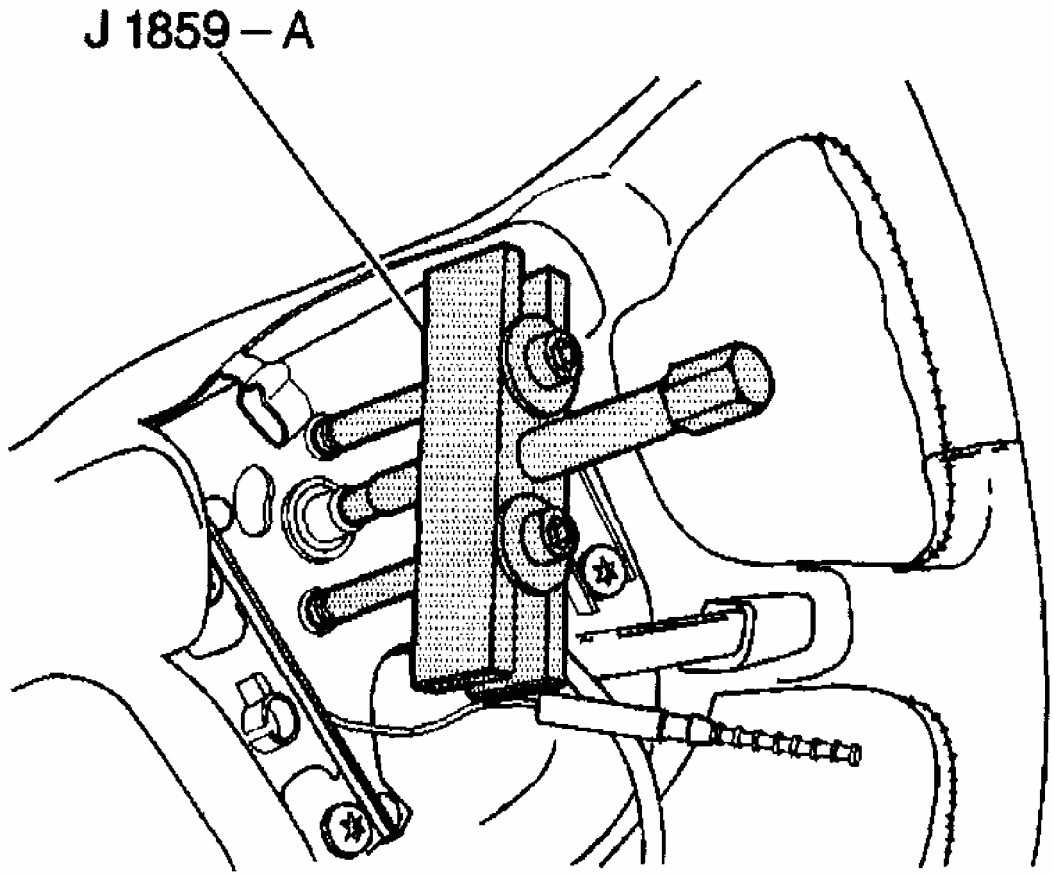

Fig. 82: Removing Steering Wheel Using Steering Wheel Puller
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

Important: Ensure that the turn signal on the multifunction switch is in the neutral position when installing the steering wheel.

1. Align the mark on the steering wheel and the steering shaft.
2. Install the steering wheel to the steering shaft.

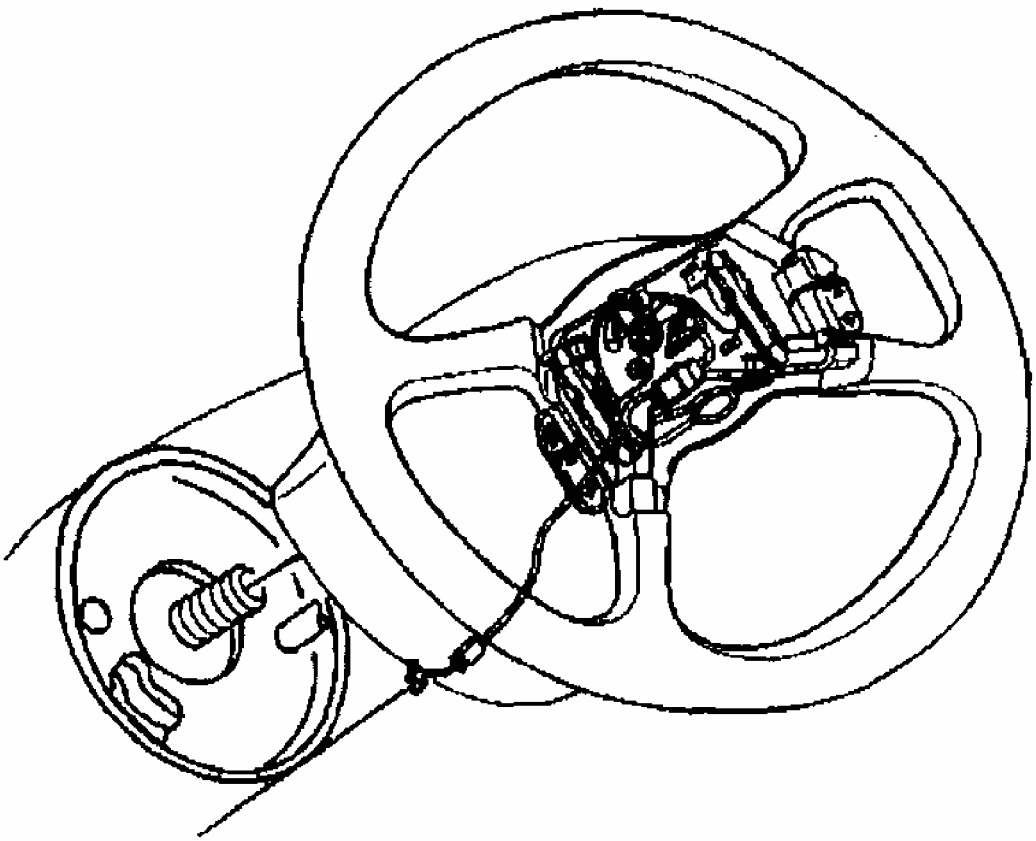

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Fig. 83: Installing Steering Wheel To Steering Shaft
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

3. Install the steering wheel retaining nut to the steering shaft.

Tighten

Tighten the nut to 41 N.m (30 lb ft).

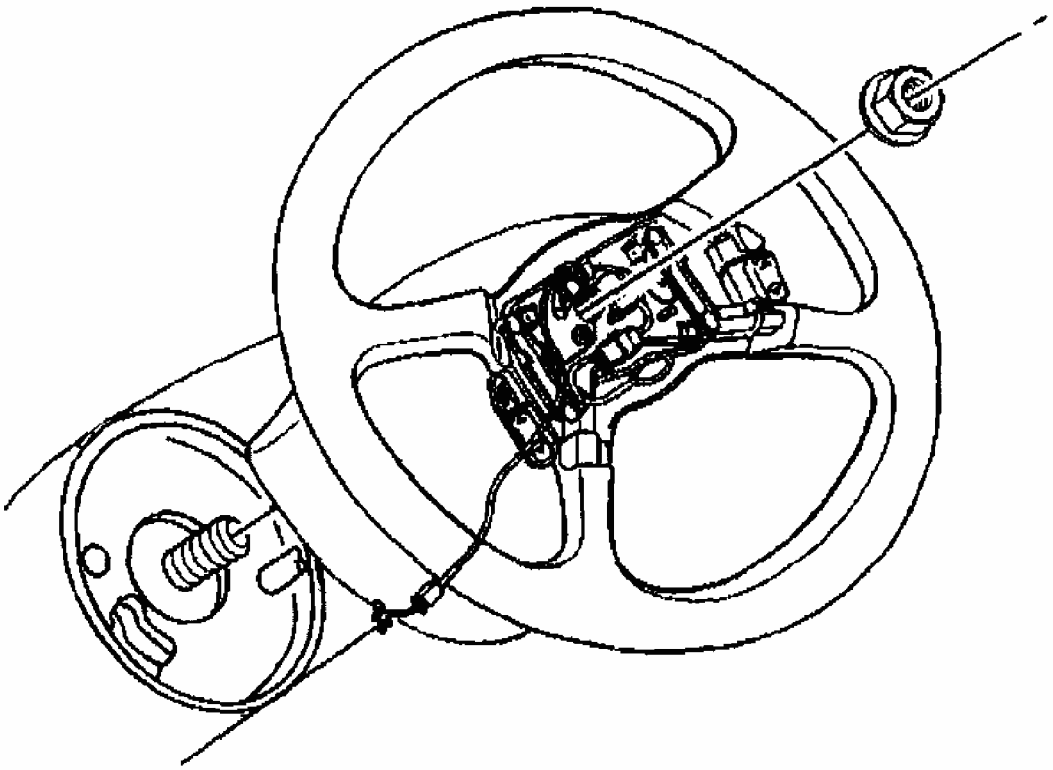

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Fig. 84: Installing Steering Wheel Retaining Nut To Steering Shaft
Courtesy of GENERAL MOTORS CORP.

4. On vehicles with redundant steering wheel controls, connect the steering wheel electrical connector.

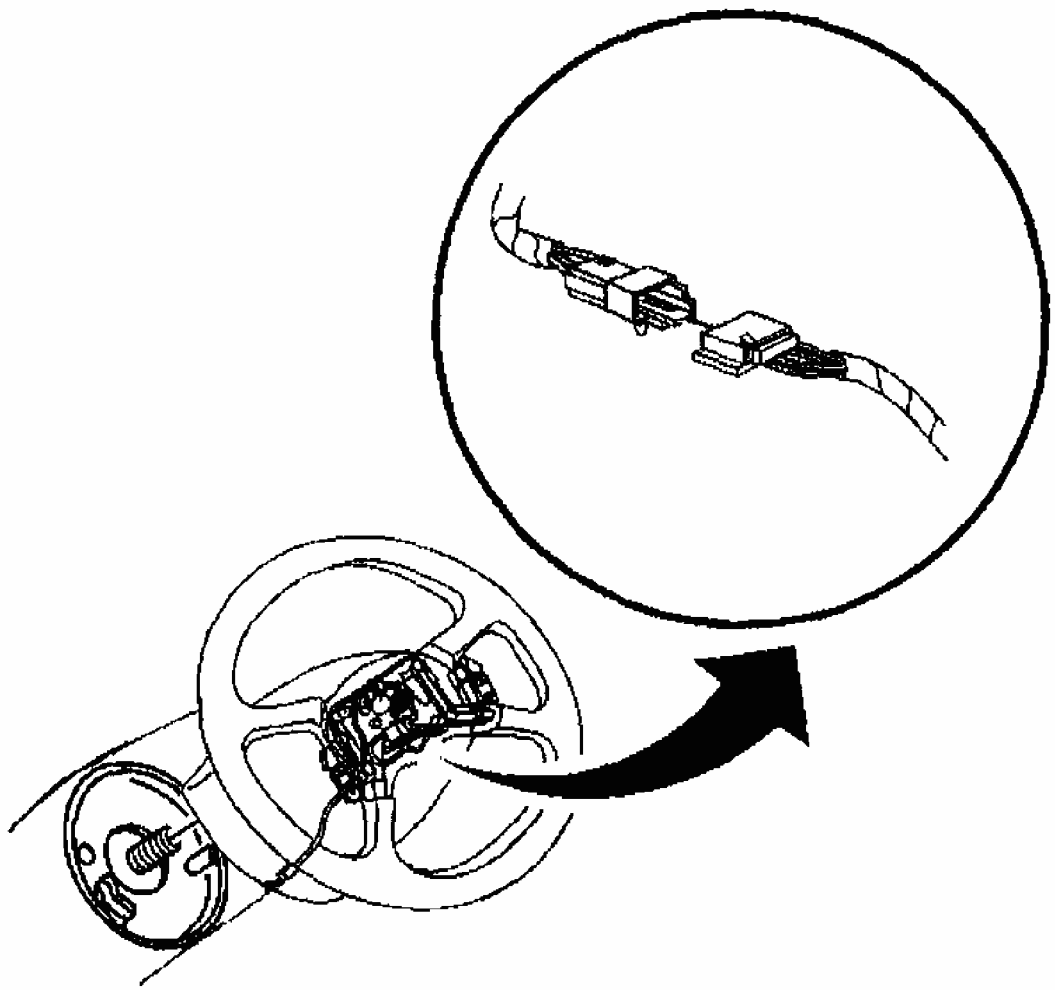

Fig. 85: Connecting Steering Wheel Electrical Connector
Courtesy of GENERAL MOTORS CORP.

5. Install the horn plunger to the steering column.
6. Install the inflator module. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE REPLACEMENT in SIR.
7. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

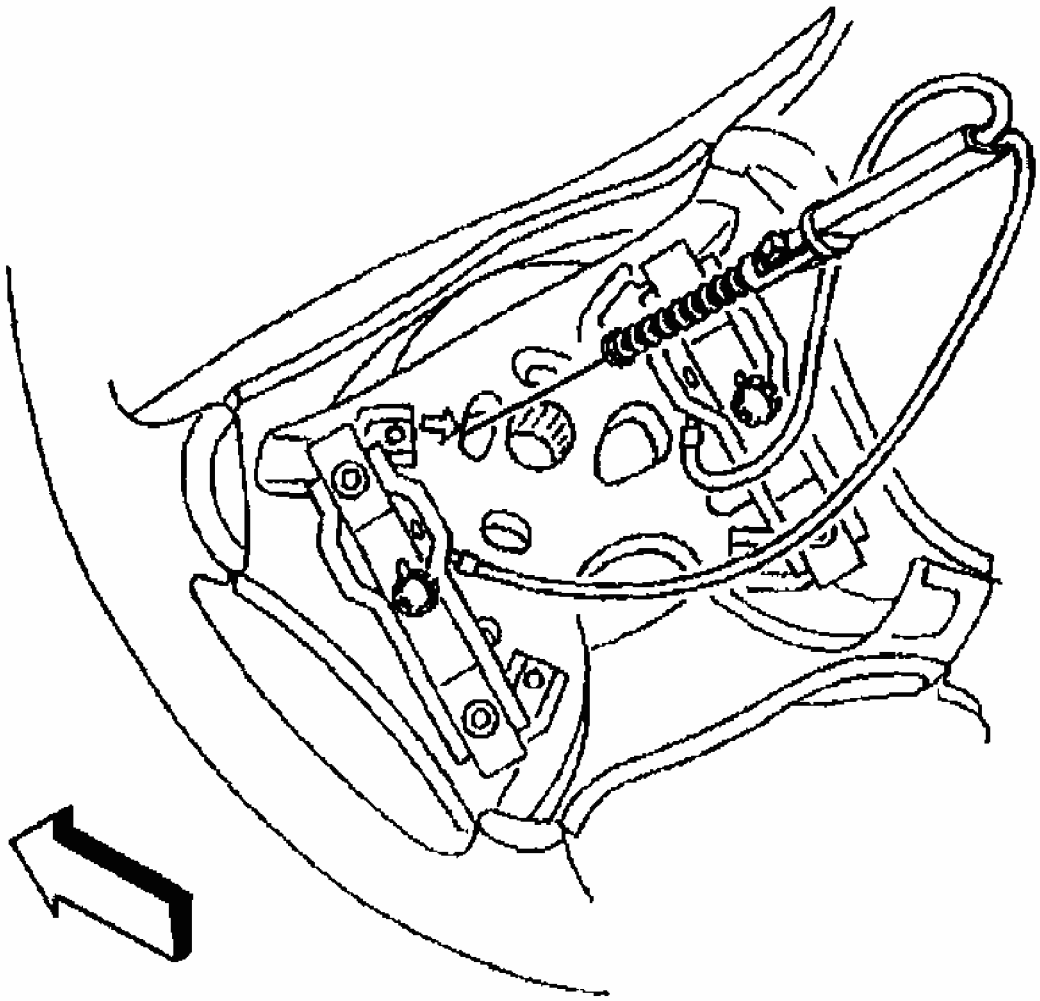

Fig. 86: Installing Horn Plunger To Steering Column
Courtesy of GENERAL MOTORS CORP.

TILT SPRING REPLACEMENT

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the upper and lower trim covers. Refer to **STEERING COLUMN TRIM COVERS REPLACEMENT** .

3. Install the tilt lever onto the steering column tilt head assembly.
4. Use the tilt lever to tilt the column to the UP position.

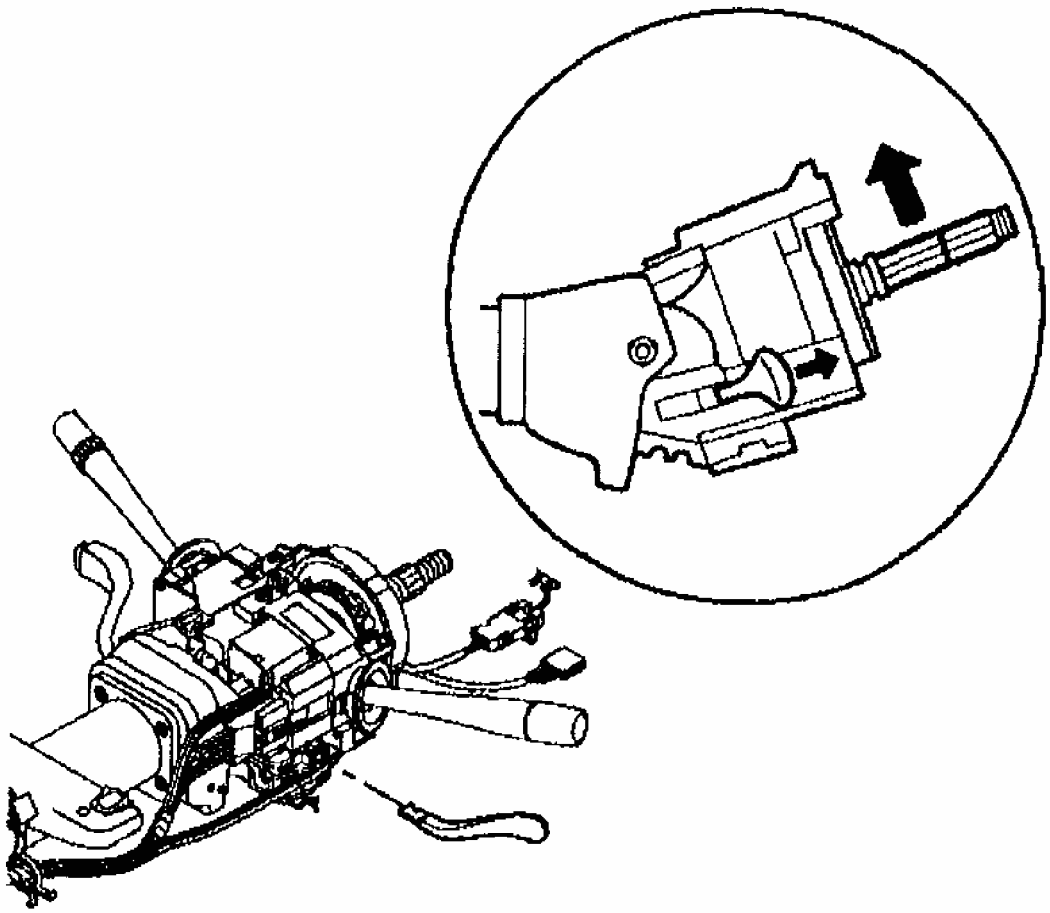

Fig. 87: Using Tilt Lever For Lifting Up Tilt Column
Courtesy of GENERAL MOTORS CORP.

CAUTION: The tilt spring and the spring guide are under pressure. The tilt spring and the spring guide may become a projectile. Secure the spring with locking pliers during removal. Secure the spring with locking pliers during installation. Bodily injury may result during removal and installation of the tilt spring and the spring guide. Always use caution during removal and installation of the tilt spring and the spring guide.

5. Remove the tilt spring (1) from the steering column support assembly (2) and from the

steering column tilt head assembly (3) by using the following procedure:

5.1. Pry up the tilt spring (1) until a bulge occurs and most of the tilt spring tension is removed.

5.2. Secure the tilt spring (1) with locking pliers.

5.3. Continue prying up the tilt spring (1) until the tilt spring disengages from the post on the steering column support assembly (2) and from the steering column tilt head assembly (3).

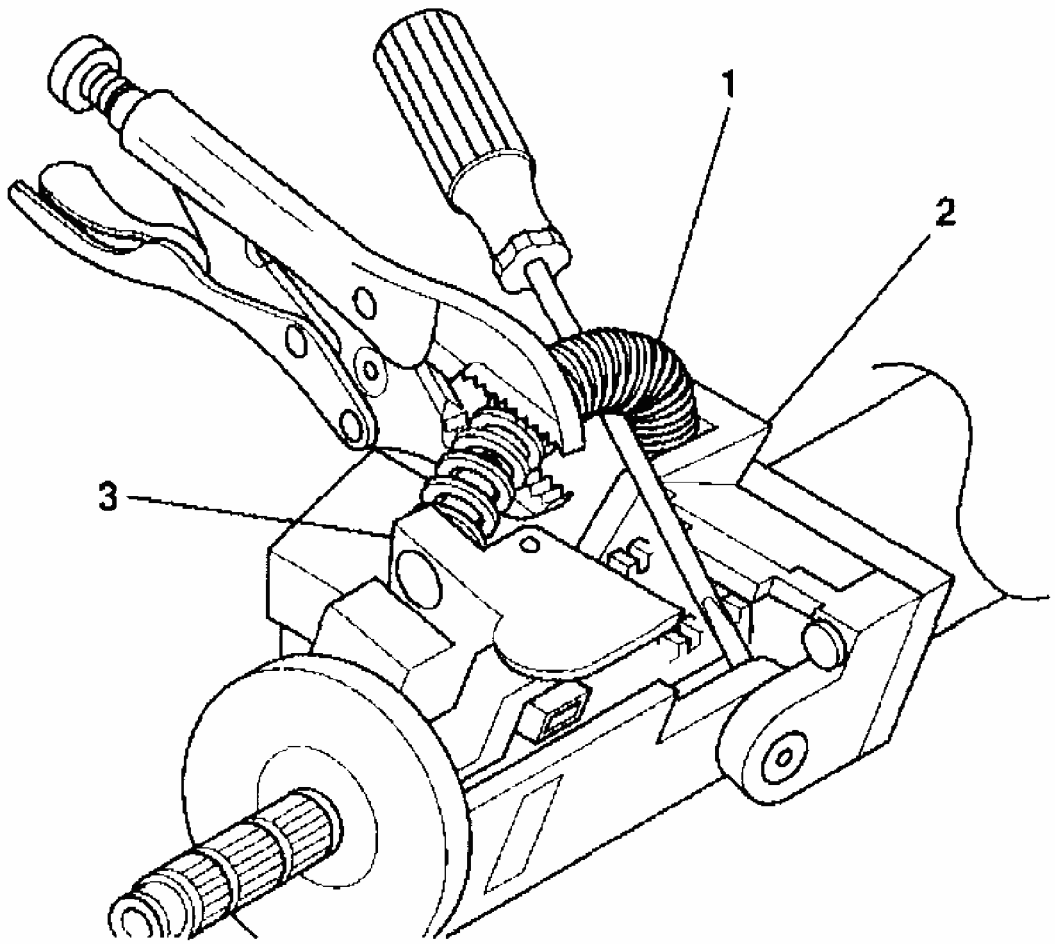

Fig. 88: Removing Tilt Spring From Steering Column Support Assembly & Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

6. Remove the spring guide (1) from the tilt spring (2).

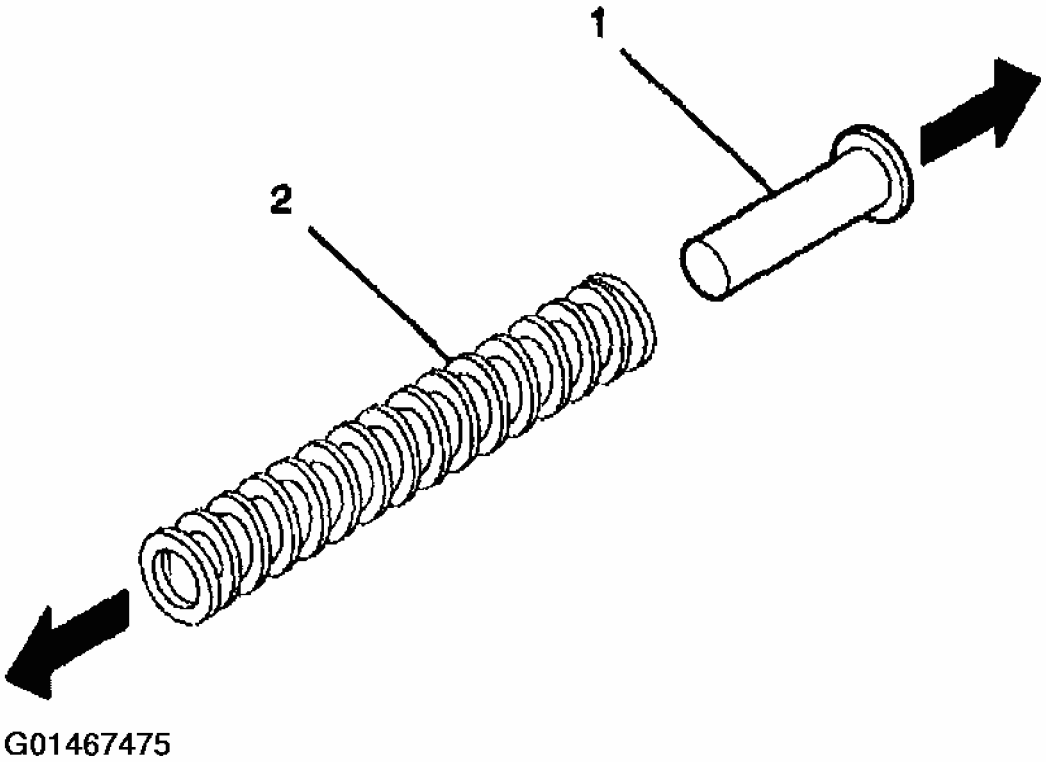

Fig. 89: Removing Spring Guide From Tilt Spring
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Use the tilt lever to tilt the column to the UP position.

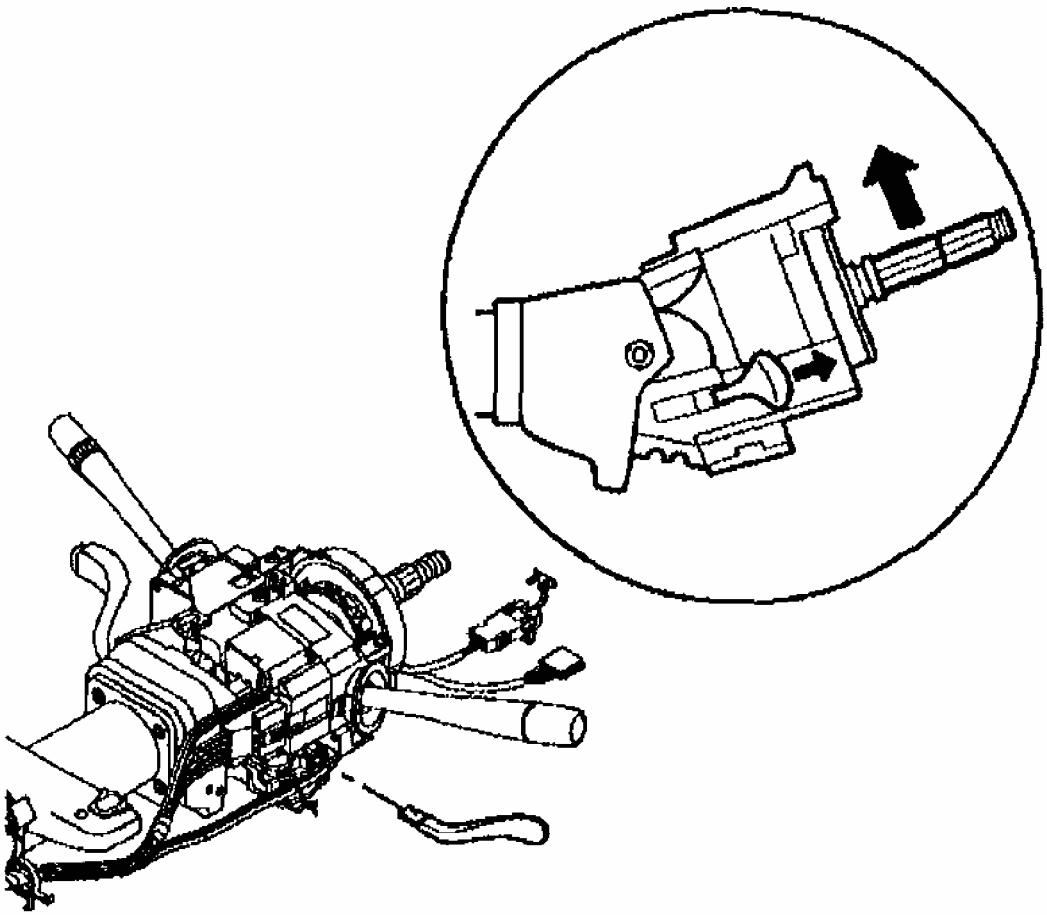

Fig. 90: Using Tilt Lever For Lifting Up To Column
Courtesy of GENERAL MOTORS CORP.

2. Install the spring guide into the tilt spring.

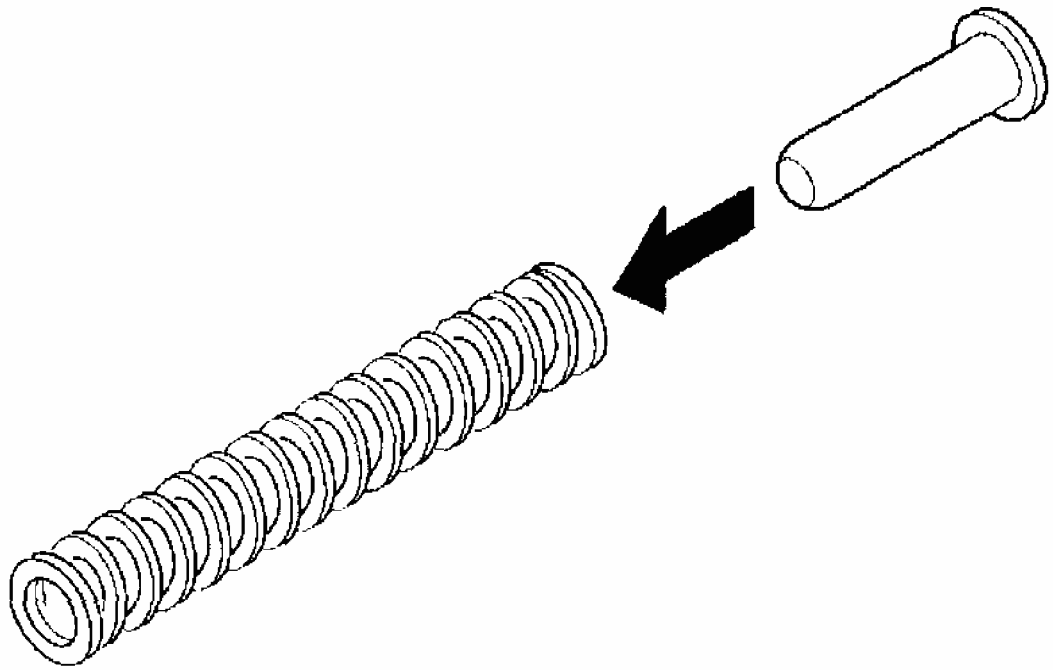

Fig. 91: Installing Spring Guide Into Tilt Spring
Courtesy of GENERAL MOTORS CORP.

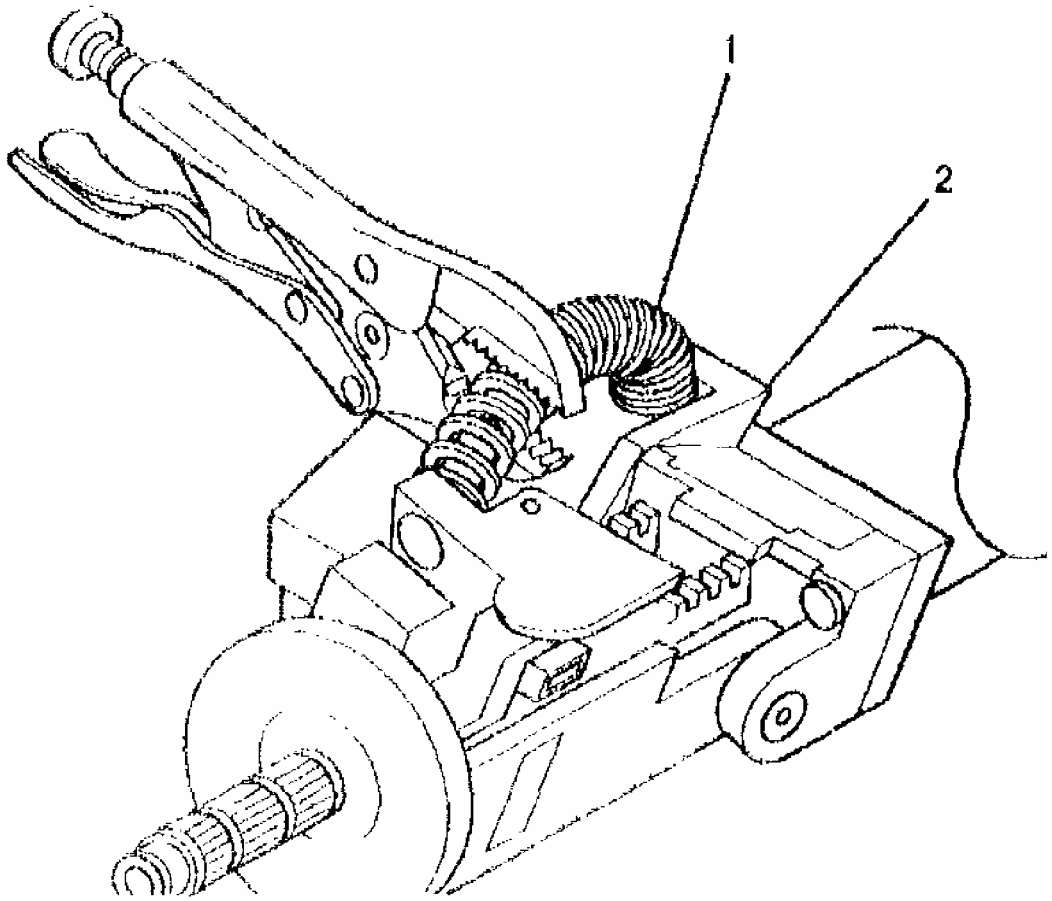

Fig. 92: Installing Tilt Spring Into Steering Column Support Assembly & Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

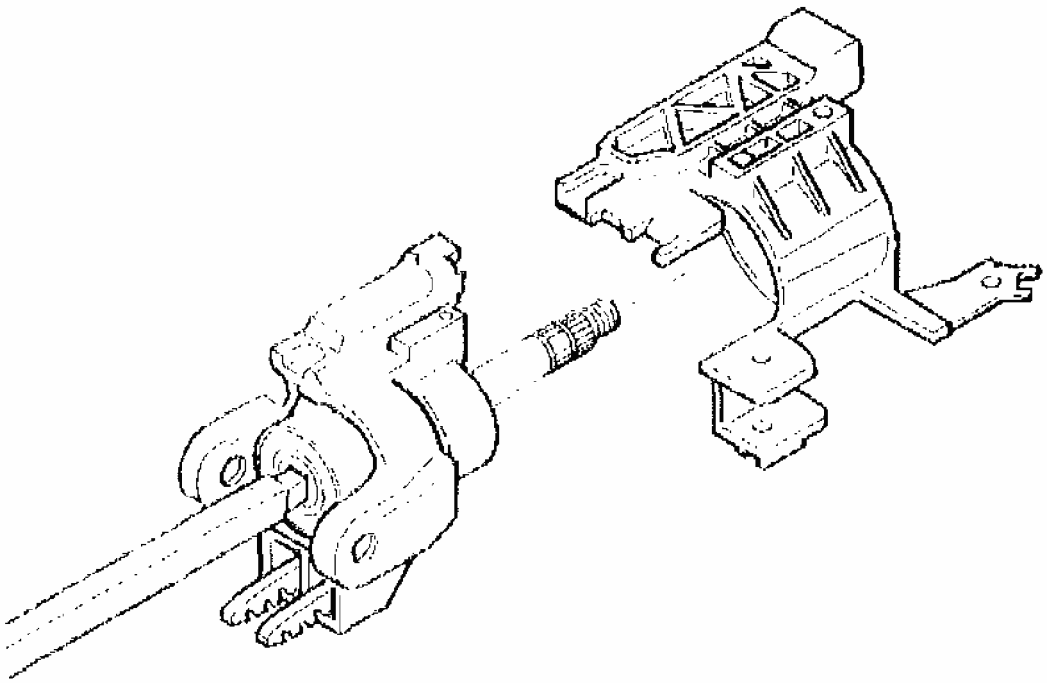

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Fig. 93: Tilt Head Housing & Steering Shaft
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the tilt head onto the steering shaft.
2. Install the tilt head housing and steering shaft as an assembly. Refer to **Fig. 94** or **Lower Bearing and Steering Column Jacket Replacement (Floor Shift Standard)** or *Lower Bearing and Steering Column Jacket Replacement (Column Shift Standard)* .

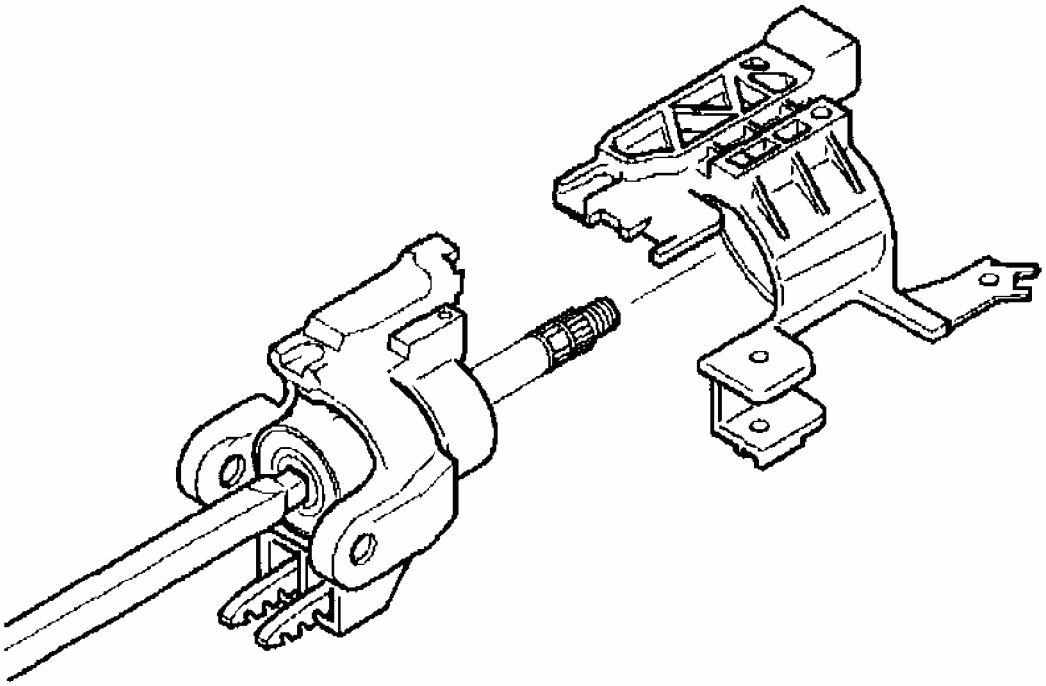

Fig. 94: Tilt Head Housing & Steering Shaft
Courtesy of GENERAL MOTORS CORP.

Important: The switch mounting bracket must be pressed firmly against the steering column tilt head.

3. Slide the turn signal switch housing onto the steering column shaft assembly.
4. Install the turn signal and multifunction switch assembly only. Refer to **MULTIFUNCTION, TURN SIGNAL SWITCH REPLACEMENT** .
5. Install the turn signal cancel cam assembly. Refer to **TURN SIGNAL CANCEL CAM AND UPPER BEARING THRUST WASHER** .
6. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

TURN SIGNAL CANCEL CAM AND UPPER BEARING THRUST WASHER

Tools Required

- *J 23653-SIR* Steering Column Lock Plate Compressor
- *J 42137* Steering Column Lock Plate Compressor Adapter

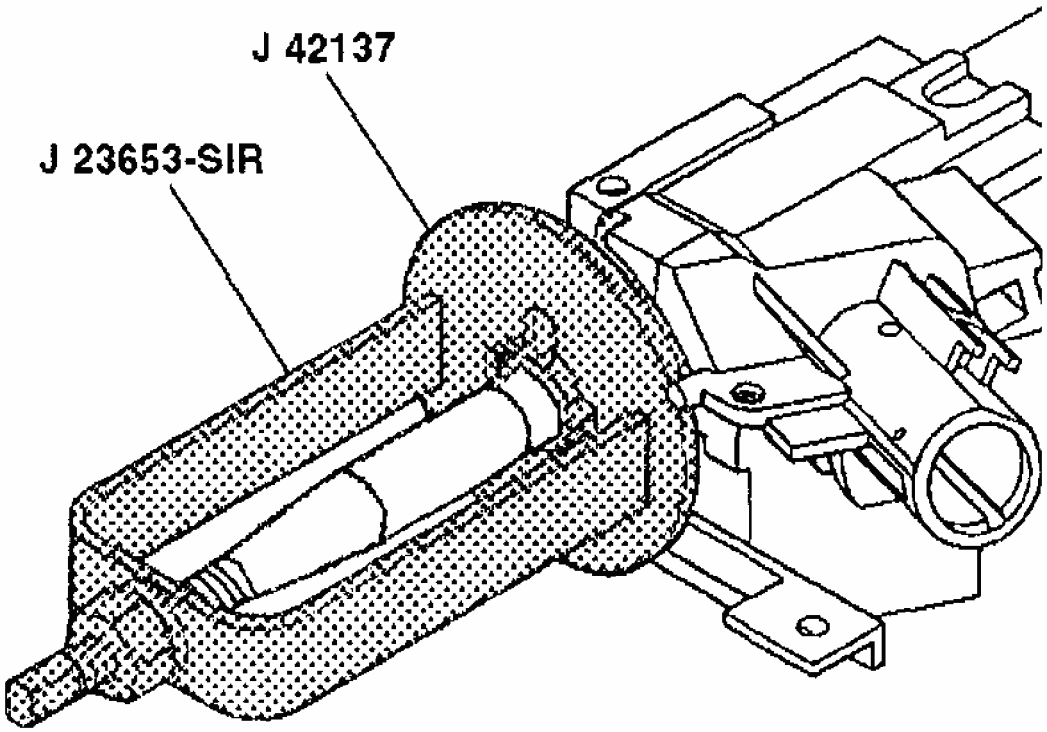

Fig. 95: Removing & Discard Bearing Retainer Using SIR Steering Column Lock Plate Compressor & Adapter
Courtesy of GENERAL MOTORS CORP.

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

   Important: Let the SIR coil hang freely after removal.

2. Remove the SIR coil. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL REPLACEMENT in SIR.
3. Remove and discard the bearing retainer using *J 23653-SIR* and *J 42137* .
4. If standard column, remove the following parts from the steering shaft assembly:
   4.1. The cam orientation plate (4)
   4.2. The turn signal cancel cam assembly (3)

4.3. The upper bearing spring (2)
4.4. The thrust washer (1)

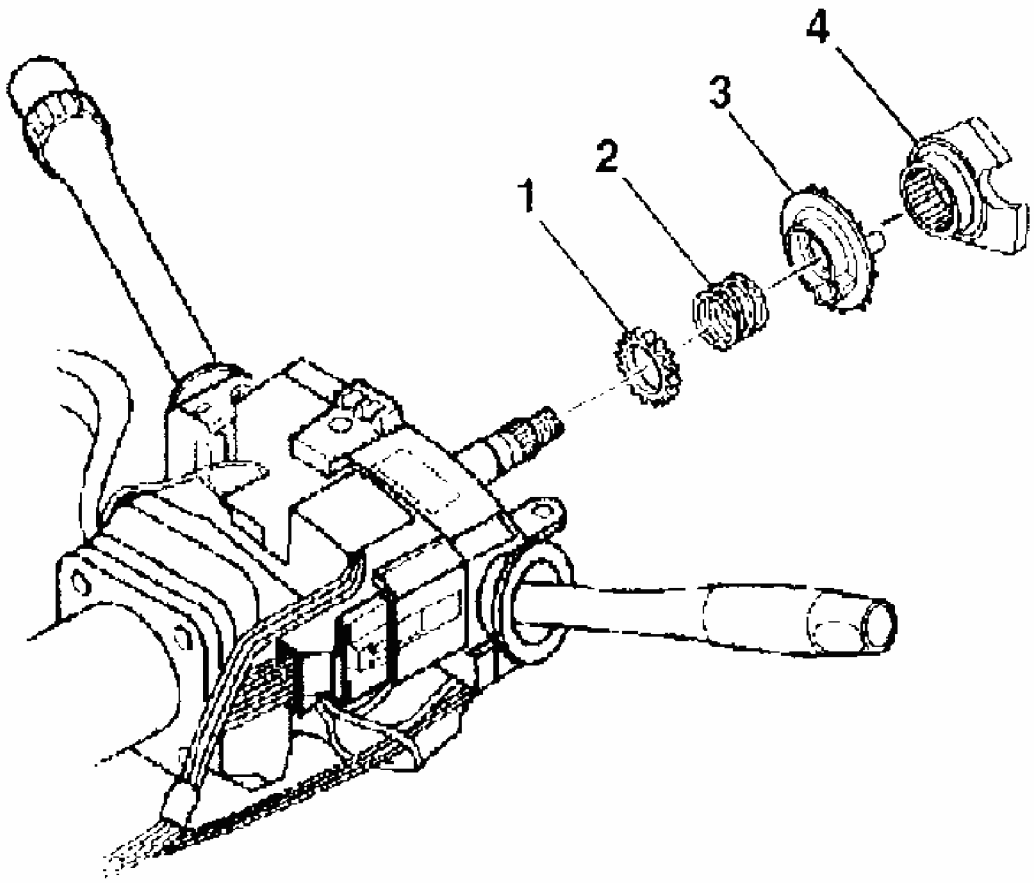

Fig. 96: Turn Signal Cancel Cam & Upper Bearing Thrust Washer (Standard Column)
Courtesy of GENERAL MOTORS CORP.

5. If tilt column, remove the following parts from the steering column shaft assembly:
   5.1. The cam orientation plate (5)
   5.2. The turn signal cancel cam assembly (4)
   5.3. The upper bearing spring (3)
   5.4. The upper bearing inner race seat (2)
   5.5. The inner race (1)

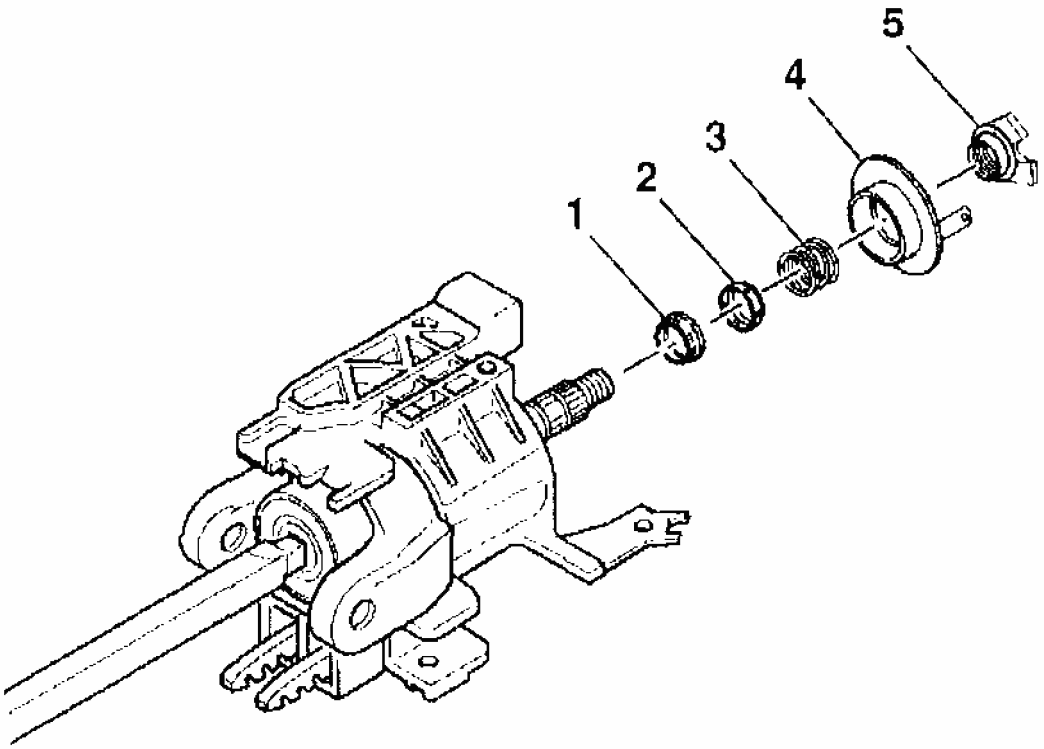

Fig. 97: Turn Signal Cancel Cam & Upper Bearing Thrust Washer (Tilt Column)
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. If standard column, install the following parts onto the steering shaft assembly:
   1.1. The thrust washer (1)
   1.2. The upper bearing spring (2)
   1.3. Lubricate the turn signal cancel cam assembly (3) with GM P/N 12377900 (Canadian P/N 10953529)
   1.4. Install the turn signal cancel cam assembly (3) onto the steering shaft assembly
   1.5. Install the cam orientation plate (4) onto the steering shaft assembly

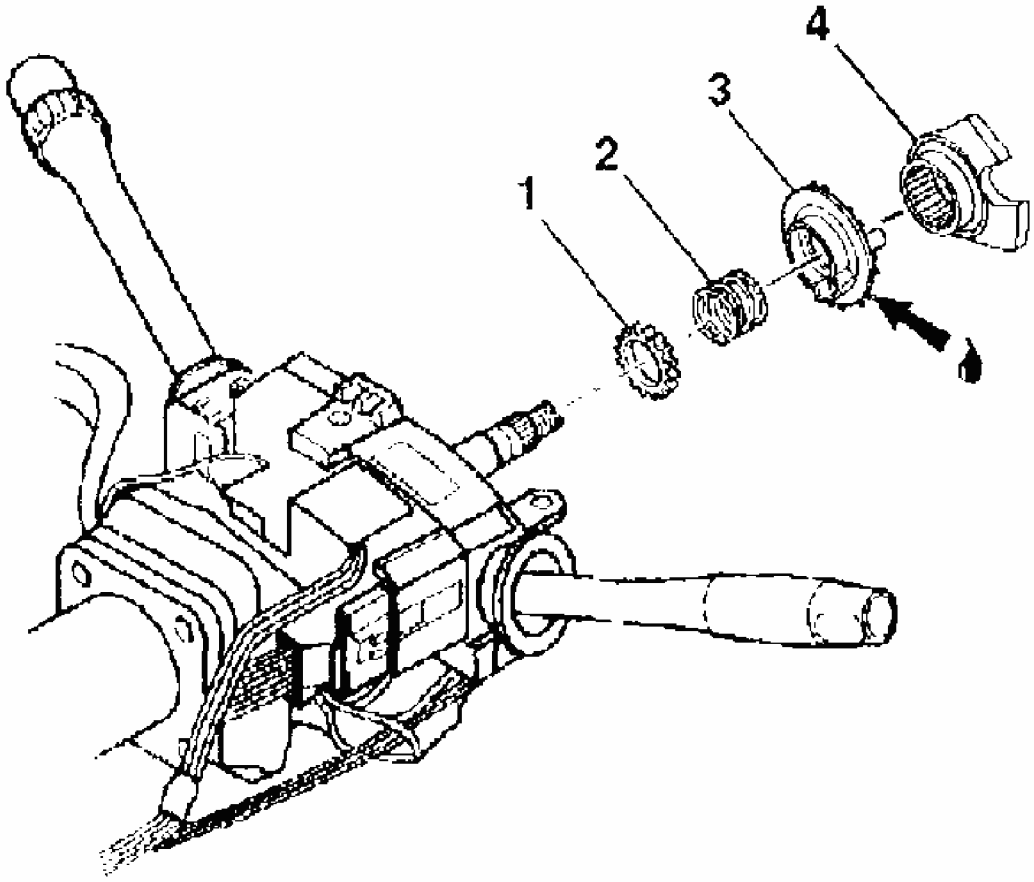

Fig. 98: Turn Signal Cancel Cam & Upper Bearing Thrust Washer (Standard Column)
Courtesy of GENERAL MOTORS CORP.

2. If tilt column, install the following parts onto the steering column shaft assembly:
   2.1. Lubricate the inner race (1) with GM P/N 12345718 (Canadian P/N 10953516)
   2.2. Install the inner race (1)
   2.3. The upper bearing inner race seat (2)
   2.4. The upper bearing spring (3)
   2.5. Lubricate the turn signal cancel cam assembly (4) with GM P/N 12377900 (Canadian P/N 10953529)
   2.6. Install the turn signal cancel cam assembly (4) onto the steering shaft assembly

2.7. The cam orientation plate (5)

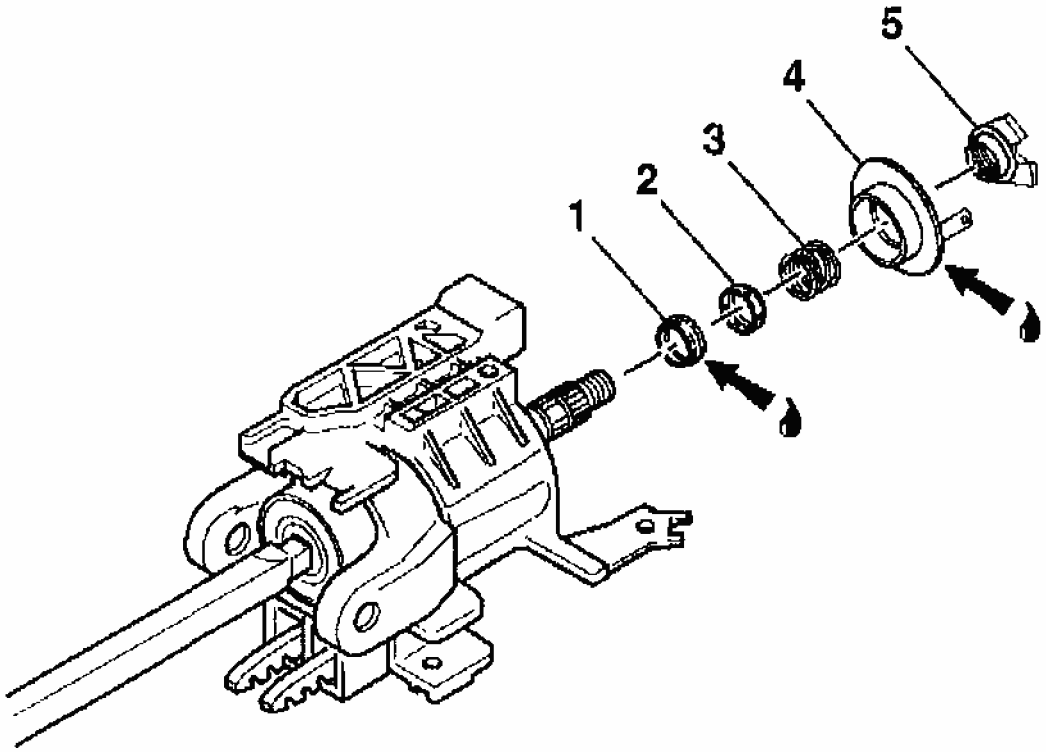

Fig. 99: Turn Signal Cancel Cam & Upper Bearing Thrust Washer (Tilt Column) Courtesy of GENERAL MOTORS CORP.

3. Install the new bearing retainer onto the steering shaft assembly.
4. Compress the cam orientation plate using *J 23653-SIR* and *J 42137* .
5. Firmly seat the bearing retainer into the groove on the steering shaft assembly.
6. Remove *J 23653-SIR* .
7. Install the SIR coil. Refer to INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL REPLACEMENT in SIR.
8. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

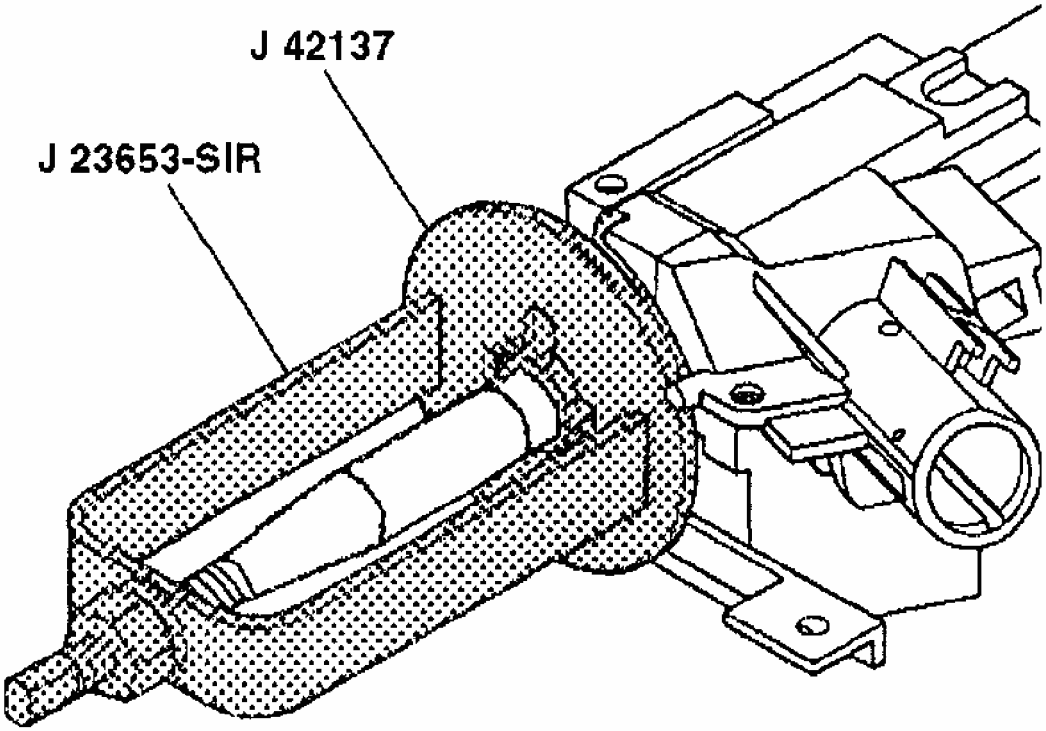

Fig. 100: Installing New Bearing Retainer Onto Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

STEERING COLUMN REPLACEMENT

Tools Required

- *J 42640* Steering Column Anti-Rotation Pin
- *J 41352* Modular Column Holding Fixture

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

NOTE: Once the steering column is removed from the vehicle, the column is extremely susceptible to damage. Dropping the column assembly on the end could collapse the steering shaft or loosen the plastic injections, which maintain column rigidity. Leaning on the column assembly could cause the jacket to bend or deform. Any of the above damage could impair the columns collapsible

design. Do NOT hammer on the end of the shaft, because hammering could loosen the plastic injections, which maintain column rigidity. If you need to remove the steering wheel, refer to the Steering Wheel Replacement procedure in this section.

NOTE: The front wheels of the vehicle must be maintained in the straight ahead position and the steering column must be in the LOCK position before disconnecting the steering column or intermediate shaft. Failure to follow these procedures will cause improper alignment of some components during installation and result in damage to the SIR coil assembly.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the steering wheel. Refer to **STEERING WHEEL REPLACEMENT** .
3. Remove the knee bolster. Refer to **KNEE BOLSTER REPLACEMENT** in Instrument Panel, Gages and Console.
4. For vehicles with a column shift, remove the range selector cable from the steering column. Refer to **AUTOMATIC TRANSMISSION RANGE SELECTOR CABLE REPLACEMENT (COLUMN SHIFT)** or **AUTOMATIC TRANSMISSION RANGE SELECTOR CABLE REPLACEMENT (CONSOLE SHIFT)** in Automatic Transmission - 4L60-E.
5. Lock the steering column through the access hole in the lower steering column trim cover using *J 42640* .

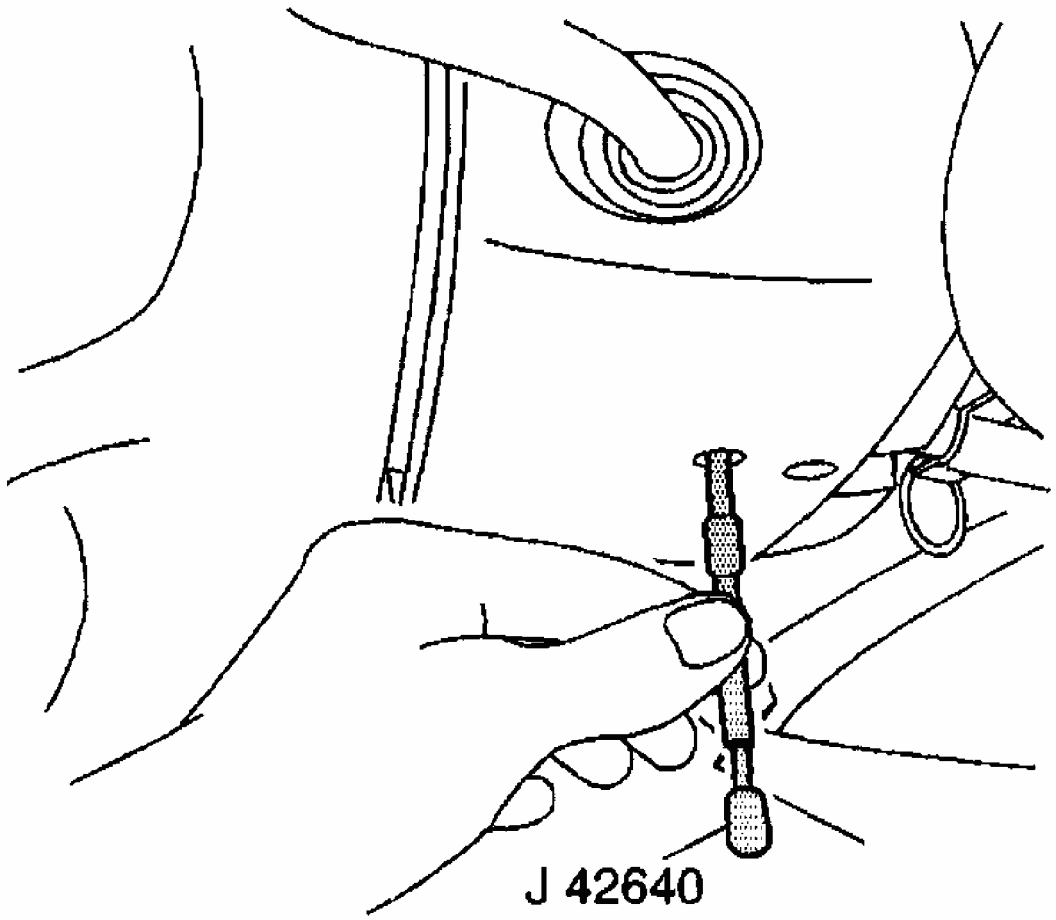

Fig. 101: Locking Steering Column Using Steering Column Anti-Rotation Pin
Courtesy of GENERAL MOTORS CORP.

6. Loosen the center screw in the steering column bulkhead connector and disconnect the bulkhead connector.

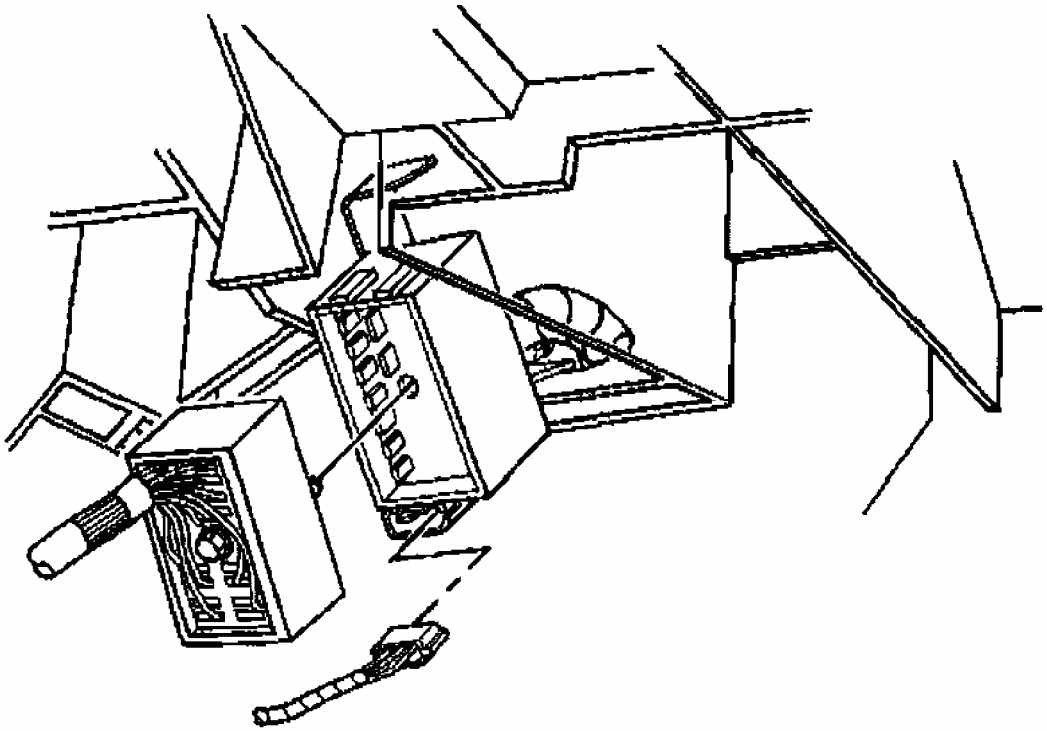

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Fig. 102: Disconnecting Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

7. Remove the retaining nuts that secure the steering column to the steering column toe plate.
8. Remove the retaining nuts that secure the steering column to the upper support bracket.
9. Remove the steering column.

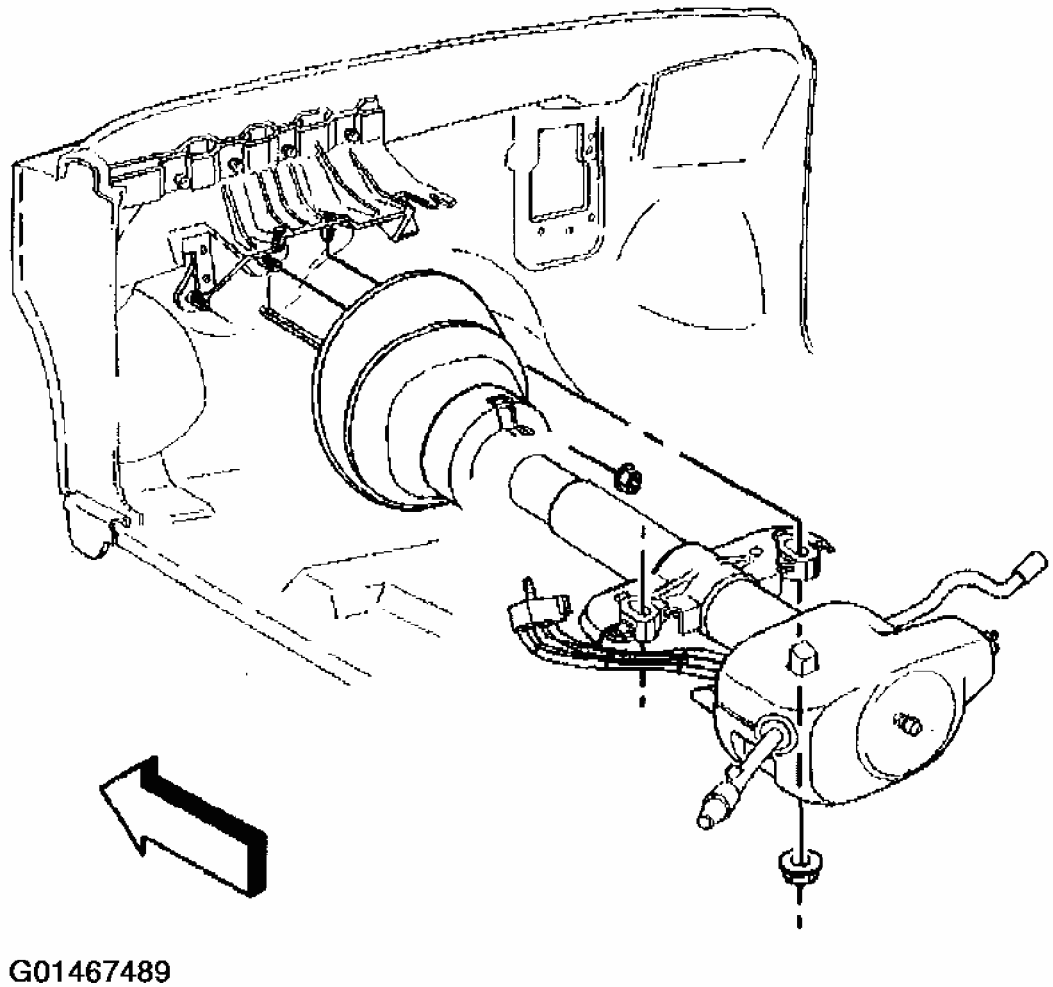


Fig. 103: Steering Column
Courtesy of GENERAL MOTORS CORP.

10. Install the steering column onto *J 41352* .
11. Remove the upper intermediate steering shaft from the steering column.

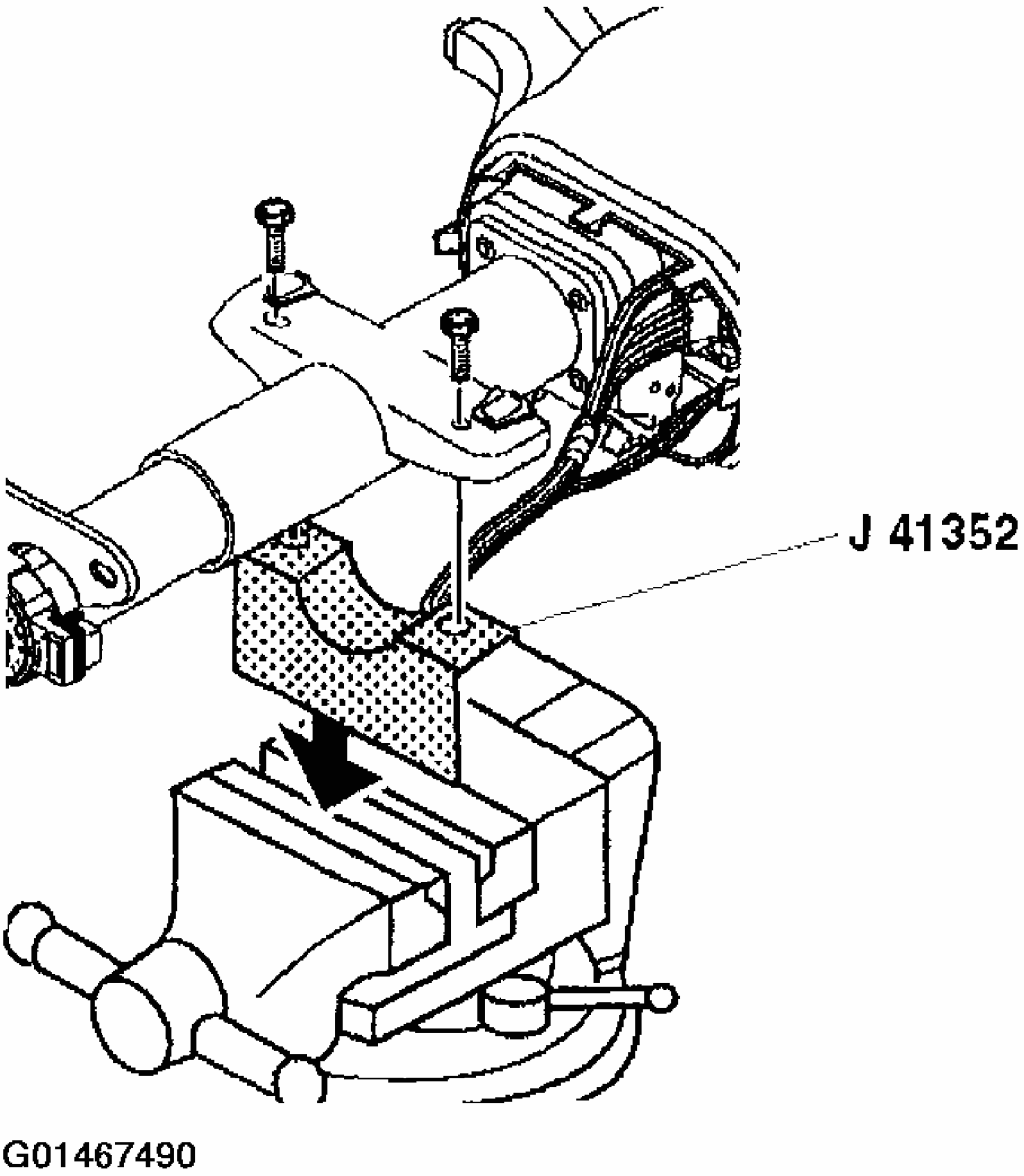


Fig. 104: Removing Upper Intermediate Steering Shaft From Steering Column
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Install the upper intermediate steering shaft to the steering column.
2. Remove the steering column from *J 41352* .

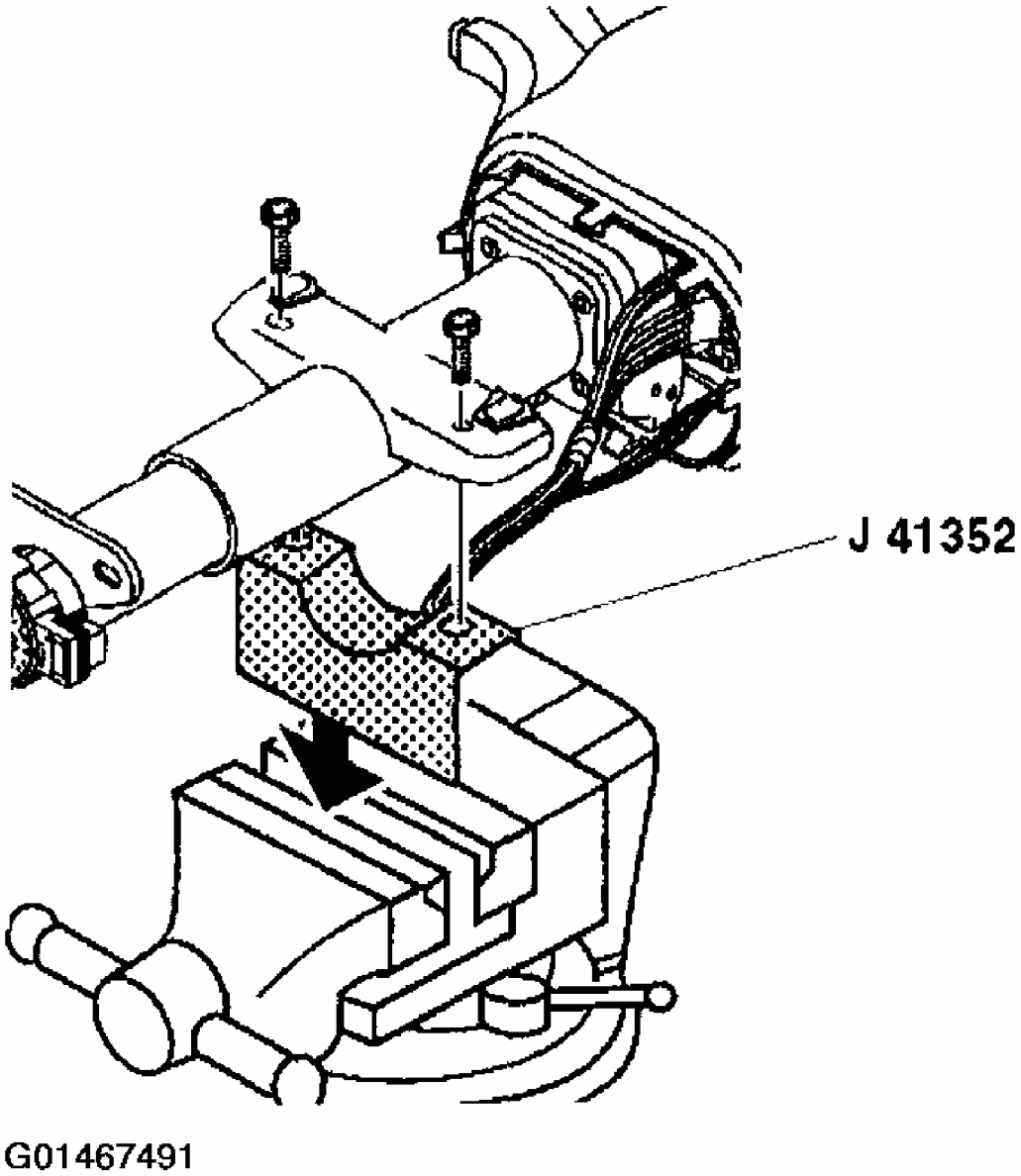


Fig. 105: Installing Upper Intermediate Steering Shaft To Steering Column
Courtesy of GENERAL MOTORS CORP.

3. Install the steering column.

CAUTION: In order to ensure the intended function of the steering column in a vehicle during a crash and in order to avoid personal injury to the driver, perform the following:

- Tighten the steering column lower fasteners before you tighten the steering column upper fasteners. Failure to do this can damage the steering column.
- Tighten the steering column fasteners to the specified torque. Overtightening the upper steering column fasteners could affect the steering column collapse.

4. Install the retaining nuts that secure the steering column to the steering column toe plate.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

5. Install the retaining nuts that secure the steering column to the upper support bracket.

Tighten

5.1. Tighten the toe plate retaining nuts to 30 N.m (22 lb ft).
5.2. Tighten the upper support bracket retaining nuts to 30 N.m (22 lb ft).

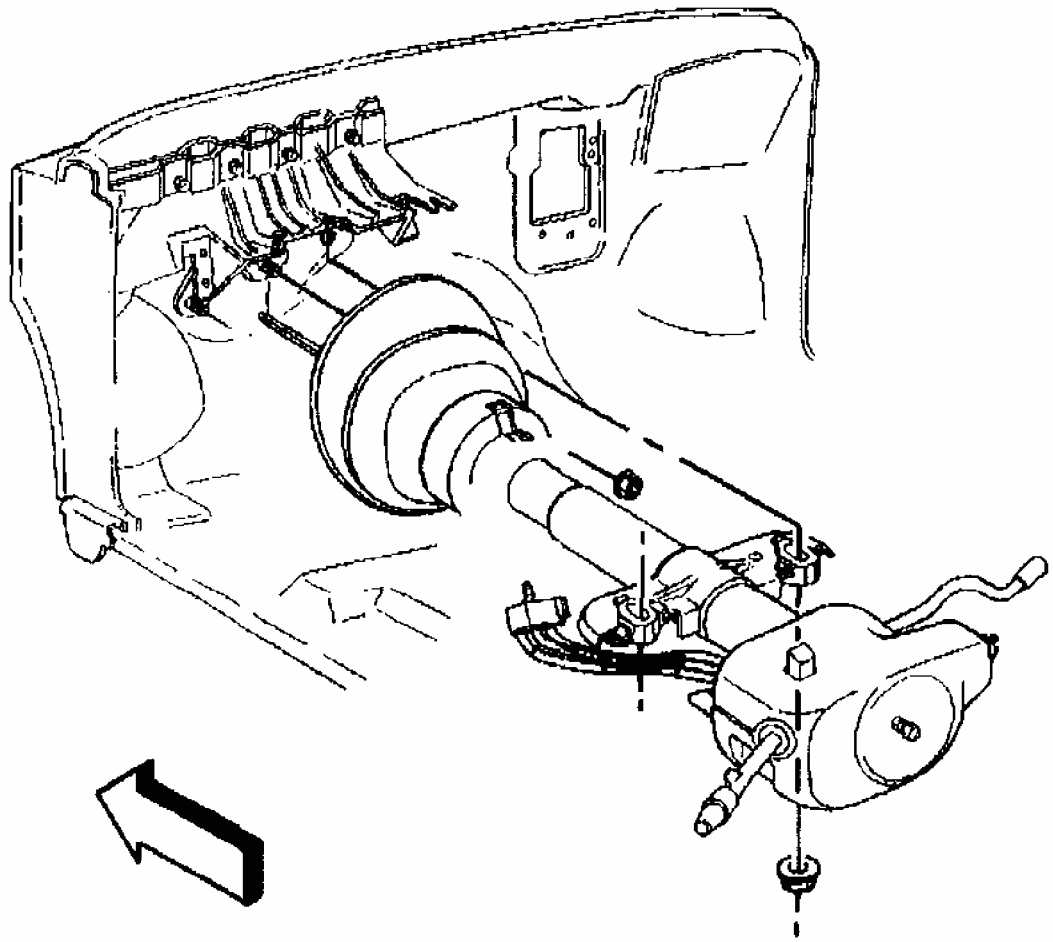
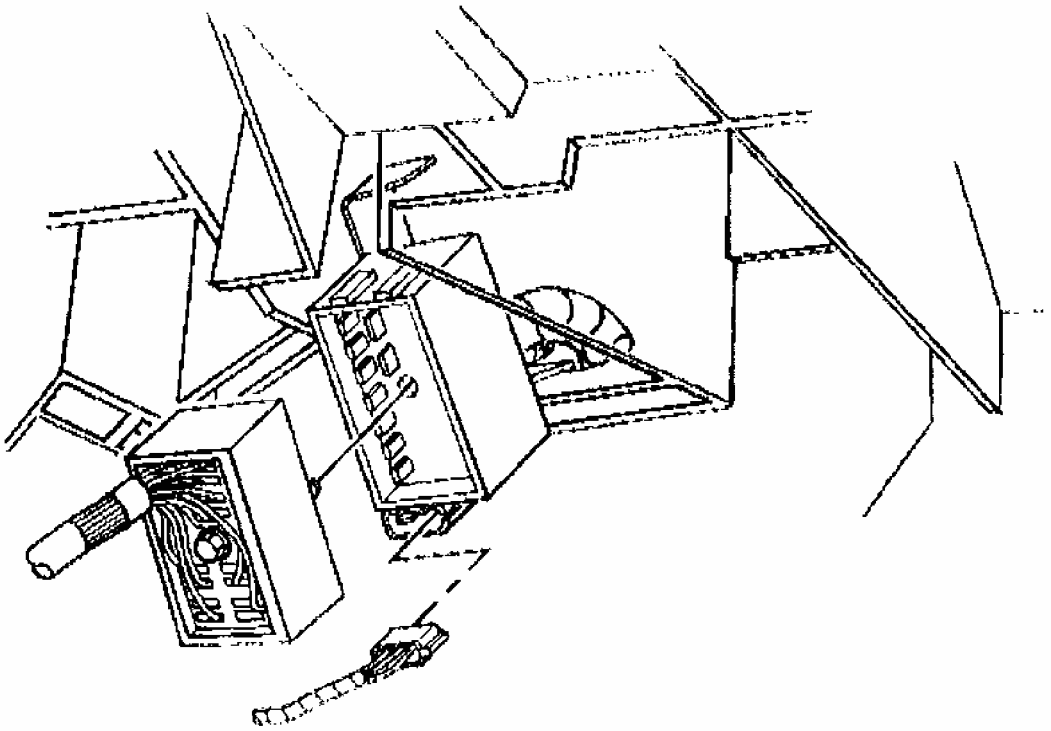


Fig. 106: Steering Column
Courtesy of GENERAL MOTORS CORP.



G01467493

Fig. 107: Connecting Bulkhead Connector
Courtesy of GENERAL MOTORS CORP.

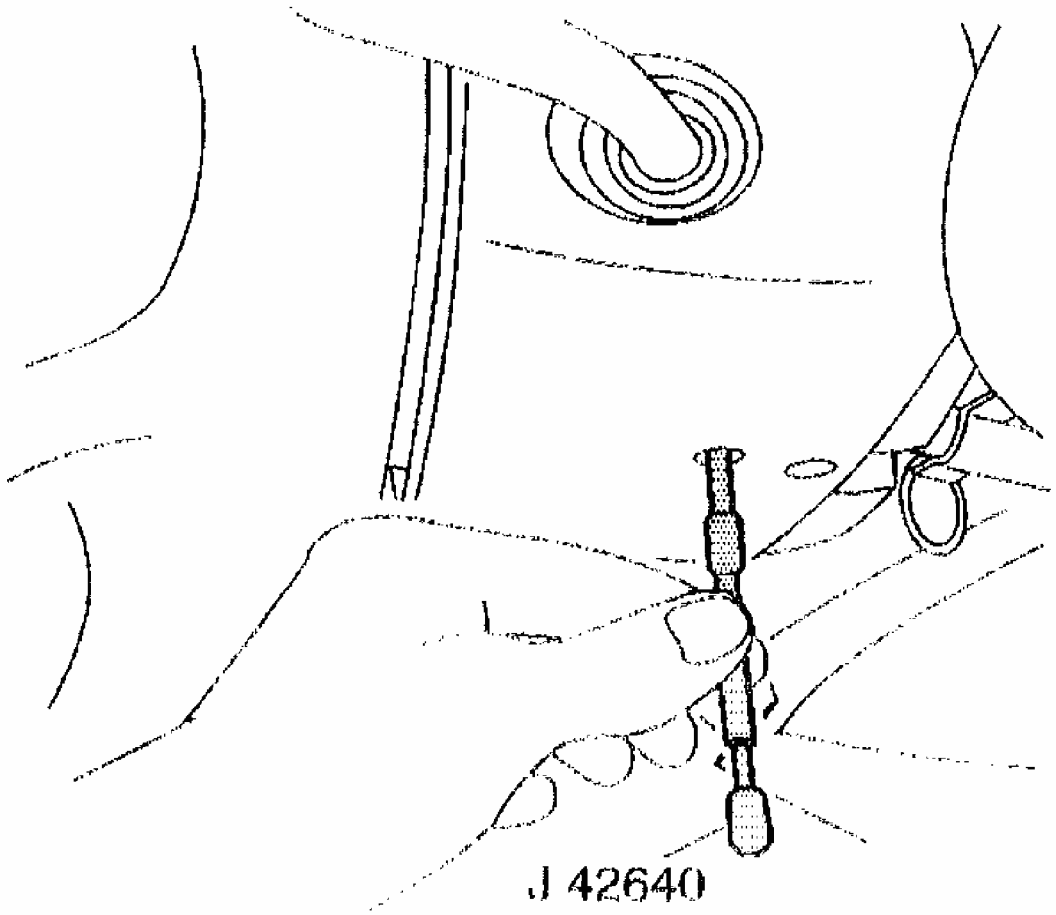


Fig. 108: Unlocking Steering Column
Courtesy of GENERAL MOTORS CORP.

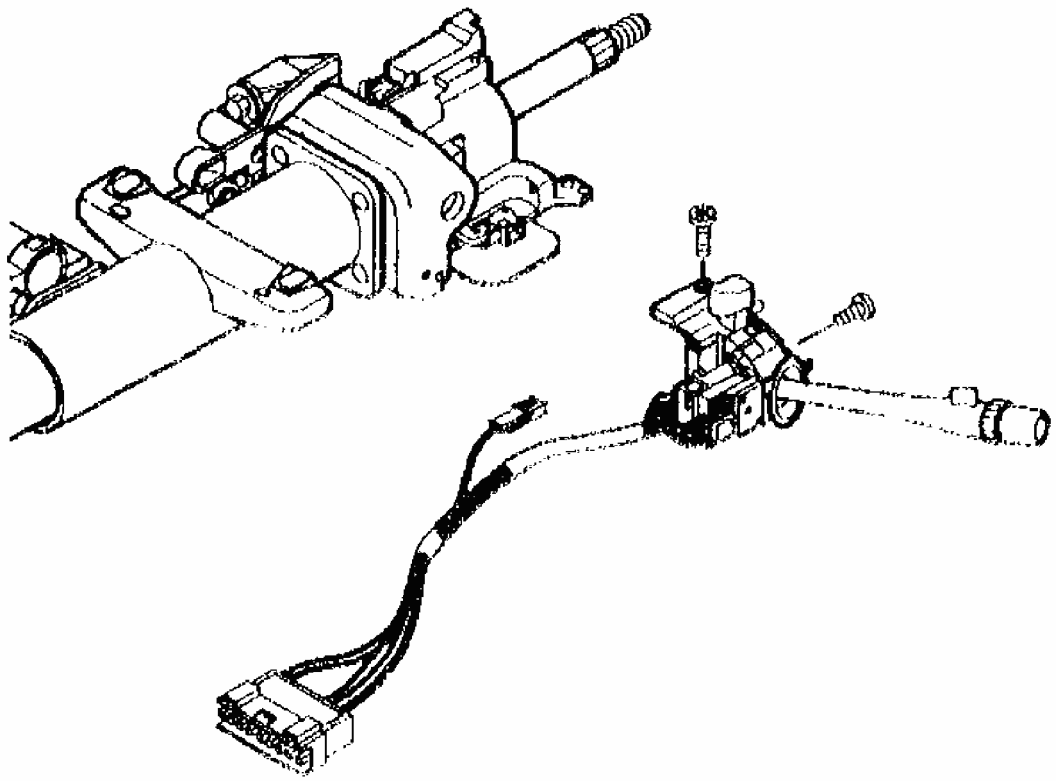


Fig. 109: Shift Lever Assembly
Courtesy of GENERAL MOTORS CORP.

Removal Procedure

1. Remove the ignition lock cylinder case. Refer to **IGNITION LOCK CYLINDER CASE REPLACEMENT (FLOOR SHIFT)** or **IGNITION LOCK CYLINDER CASE REPLACEMENT (COLUMN SHIFT)** .
2. Remove the tilt spring assembly only. Refer to **TILT SPRING REPLACEMENT** .
3. Inspect the steering column for accident damage. Refer to **STEERING COLUMN ACCIDENT DAMAGE INSPECTION** .
4. Remove the 2 pan head tapping screws from the turn signal and multifunction switch assembly.

   Remove the turn signal and multifunction switch assembly.

NOTE: **Do not use excessive force when removing the automatic transmission shift lock control from the steering column. Using excessive force may cause damage to the automatic**

transmission shift lock control and/or the steering column.

5. Remove the A/T shift lock control using the following procedure:
   1. Put the shift lever clevis into the NEUTRAL position.
   2. Use a small screwdriver to pry the A/T shift lock control away from the steering column jacket assembly and the cable shift cam assembly.

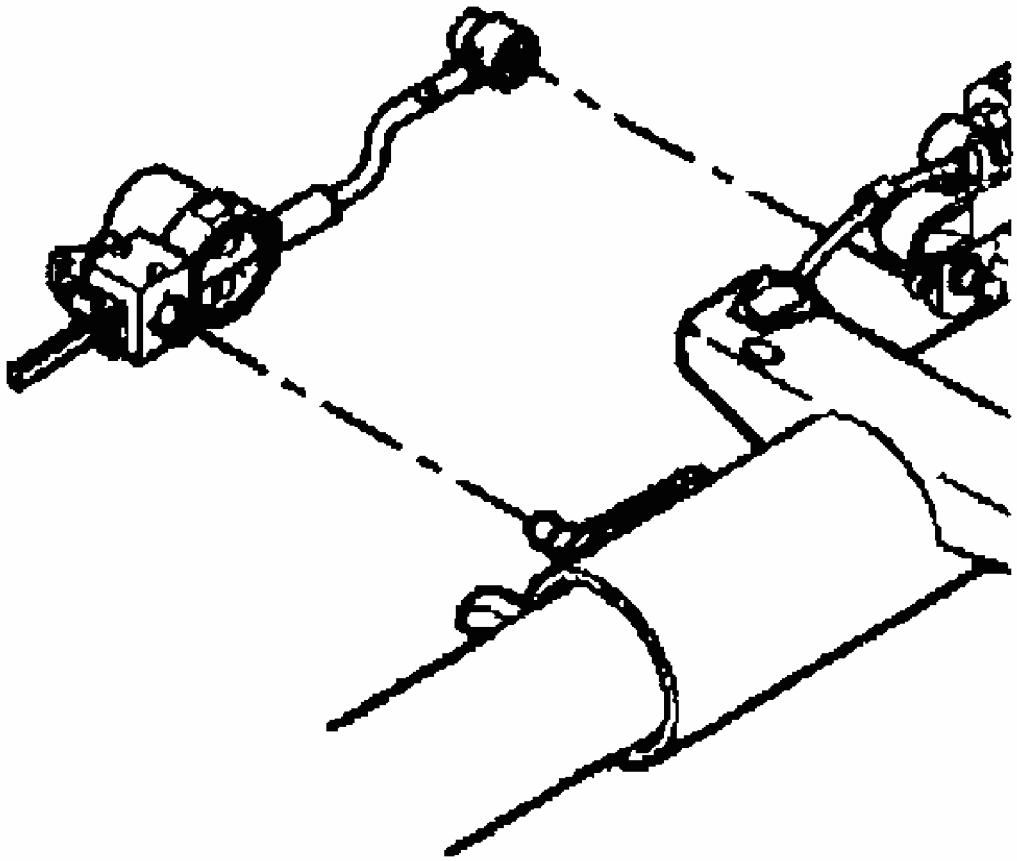


Fig. 110: A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

6. Remove the 3 flat head tapping screws from the linear shift assembly.

   Remove the linear shift assembly from the steering column support assembly.

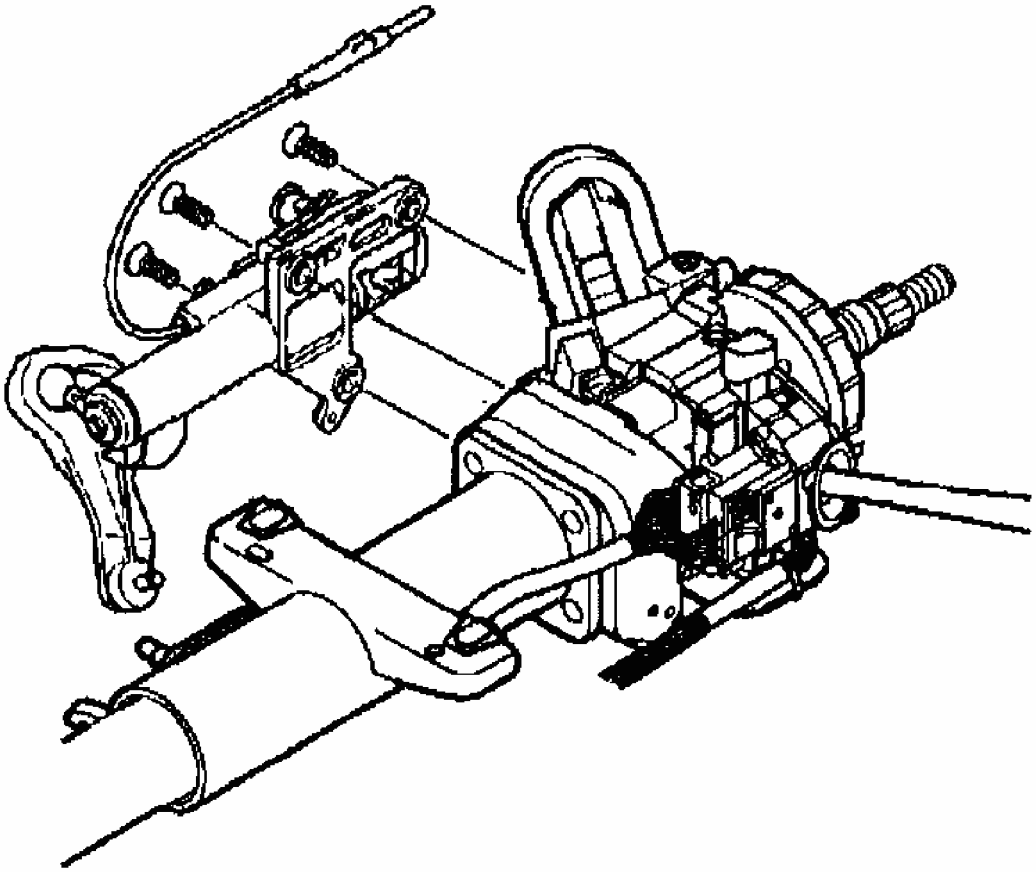


Fig. 111: Removing Linear Shift Assembly From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner boot seal (4).
8. Remove the steering shaft seal (3) from the adapter and bearing assembly (1).
9. Remove the shaft seal retainer (2) from the adapter and bearing assembly (1).
10. Remove the adapter and bearing assembly (1) from the steering shaft assembly.

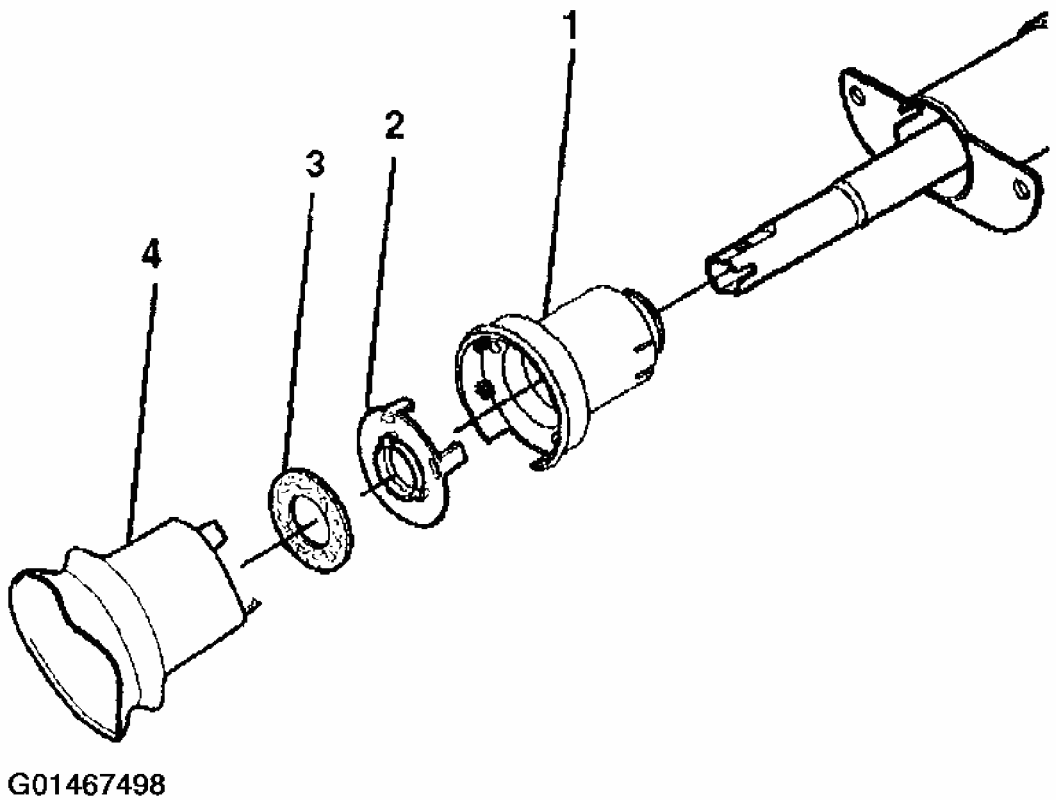


Fig. 112: Removing Adapter & Bearing Assembly From Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

11. Use *J 21854-01* to remove the 2 pivot pins (3) from the steering column tilt head assembly (1).

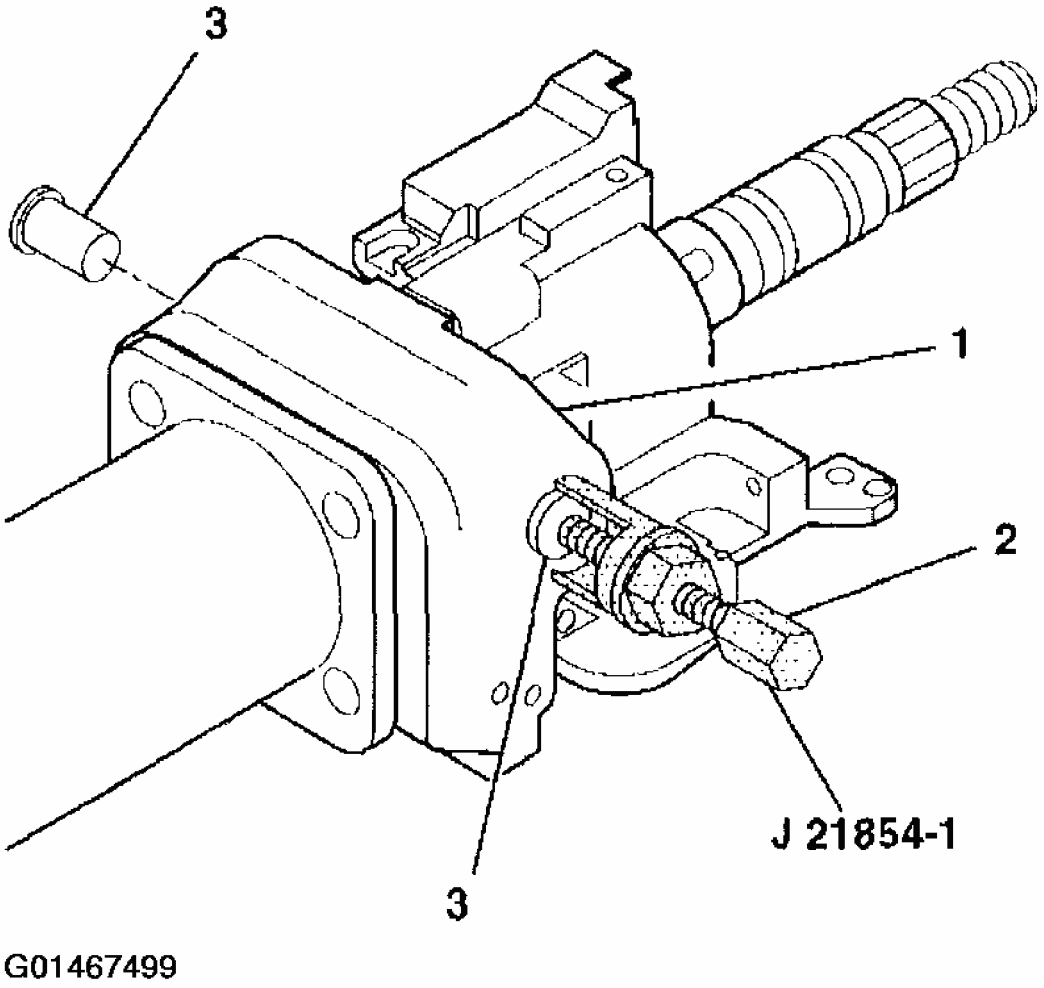


Fig. 113: Removing Pivot Pins From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

12. Install the tilt lever into the tilt head assembly (1).
13. Pull back on the tilt lever and at the same time pull the tilt head assembly (1) down and away from the steering column.
14. Remove the tilt head assembly (1) with the steering shaft assembly from the steering column jacket assembly (2).
15. Remove the tilt lever.

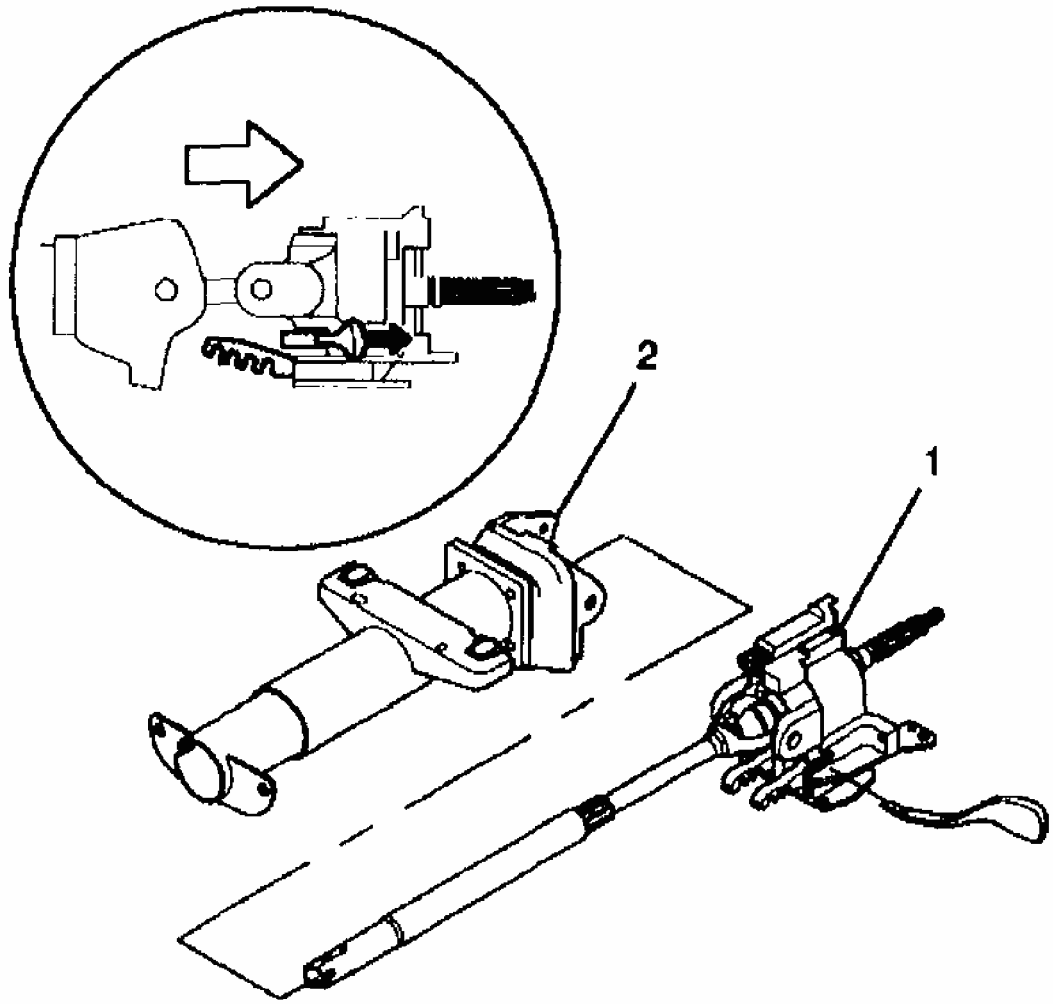


Fig. 114: Removing Tilt Head Assembly With Steering Shaft Assembly From Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

16. Remove the steering shaft assembly (2) from the steering column tilt head assembly (1).

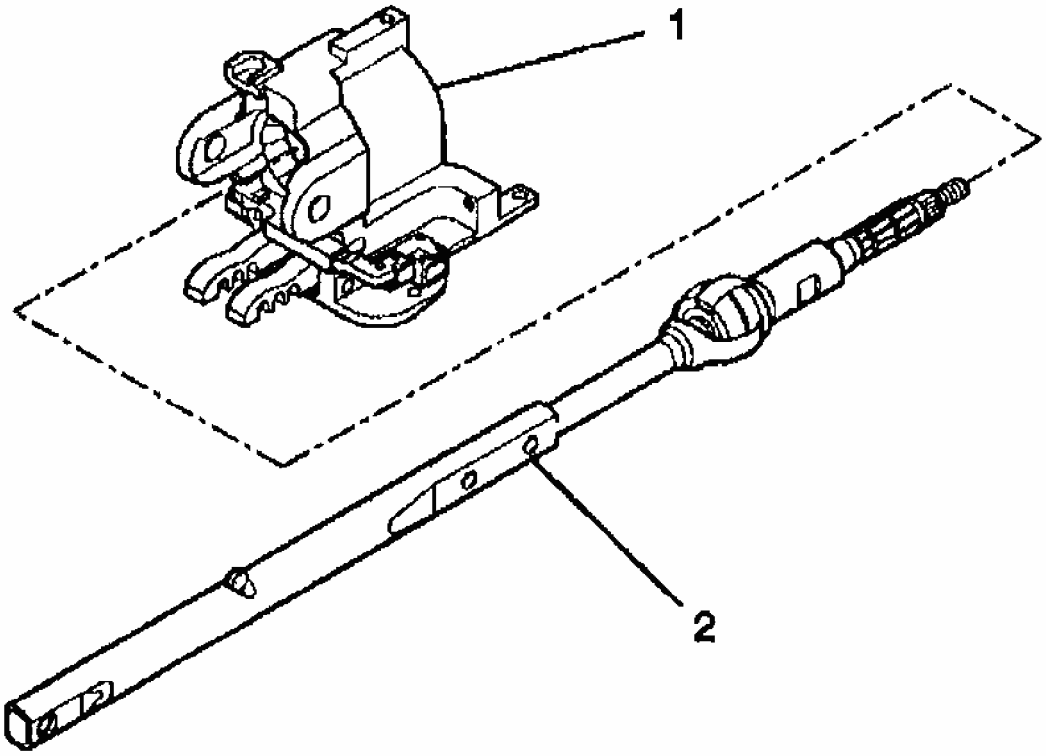


Fig. 115: Removing Steering Shaft Assembly From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

Important: Mark the race and upper shaft assembly and the lower shaft assembly before disassembly. Failure to assemble the race and upper shaft assembly and the lower shaft assembly correctly will cause the steering wheel to be turned 180 degrees.

17. Tilt the race and upper shaft assembly (1) 90 degrees to the lower shaft assembly (2).
18. Disengage the race and upper shaft assembly (1) from the lower shaft assembly (2).

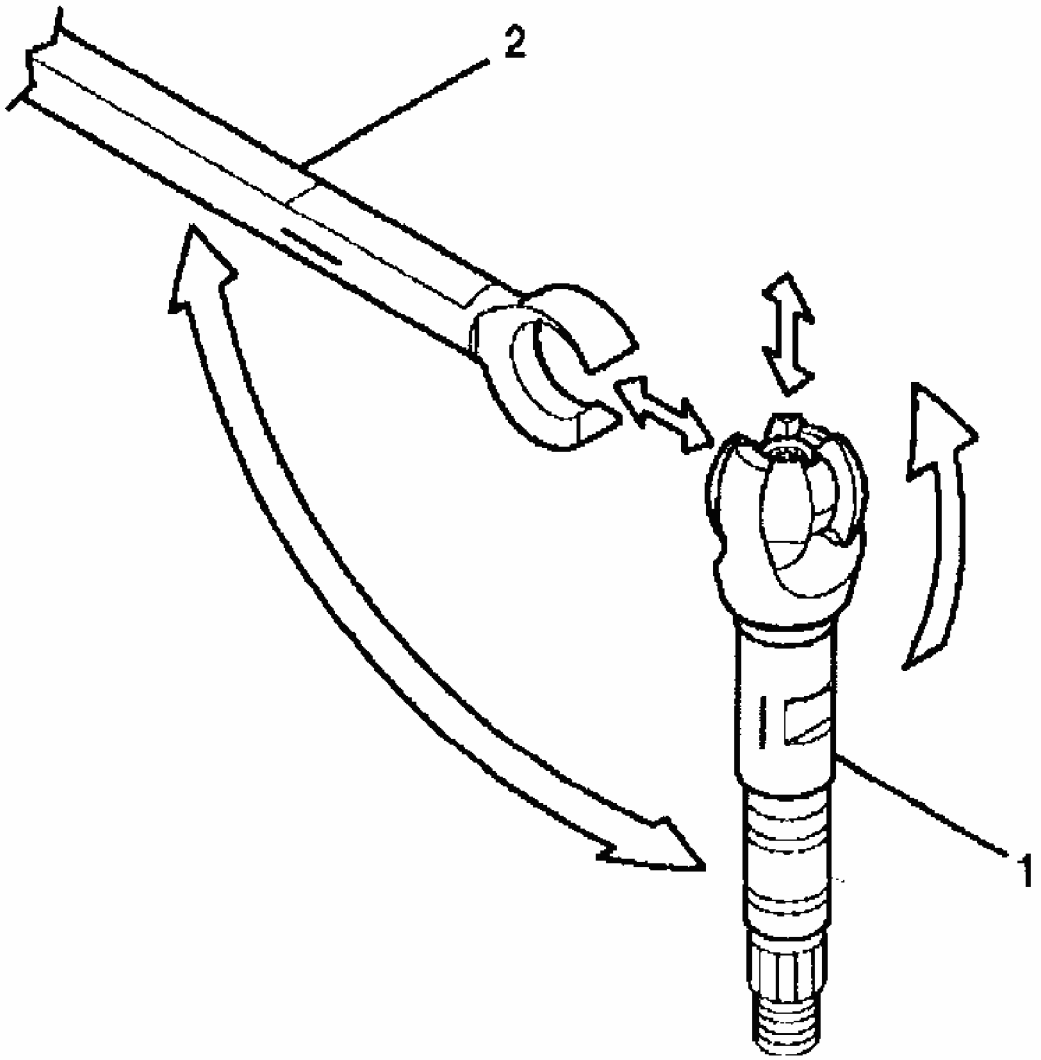


Fig. 116: Disengaging Race & Upper Shaft Assembly From Lower Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

19. Insert the race and upper shaft assembly (1) into *J 41688* .
20. Insert *J 41688* into a vise.
21. Rotate the driver 90 degrees in the counterclockwise direction in order to disengage the centering sphere from the race and upper shaft assembly.
22. Remove the race and upper shaft assembly (1) from *J 41688* .
23. Remove the shaft preload spring and the centering sphere from *J 41688* .
24. If necessary, discard the old centering sphere and the old shaft preload spring.

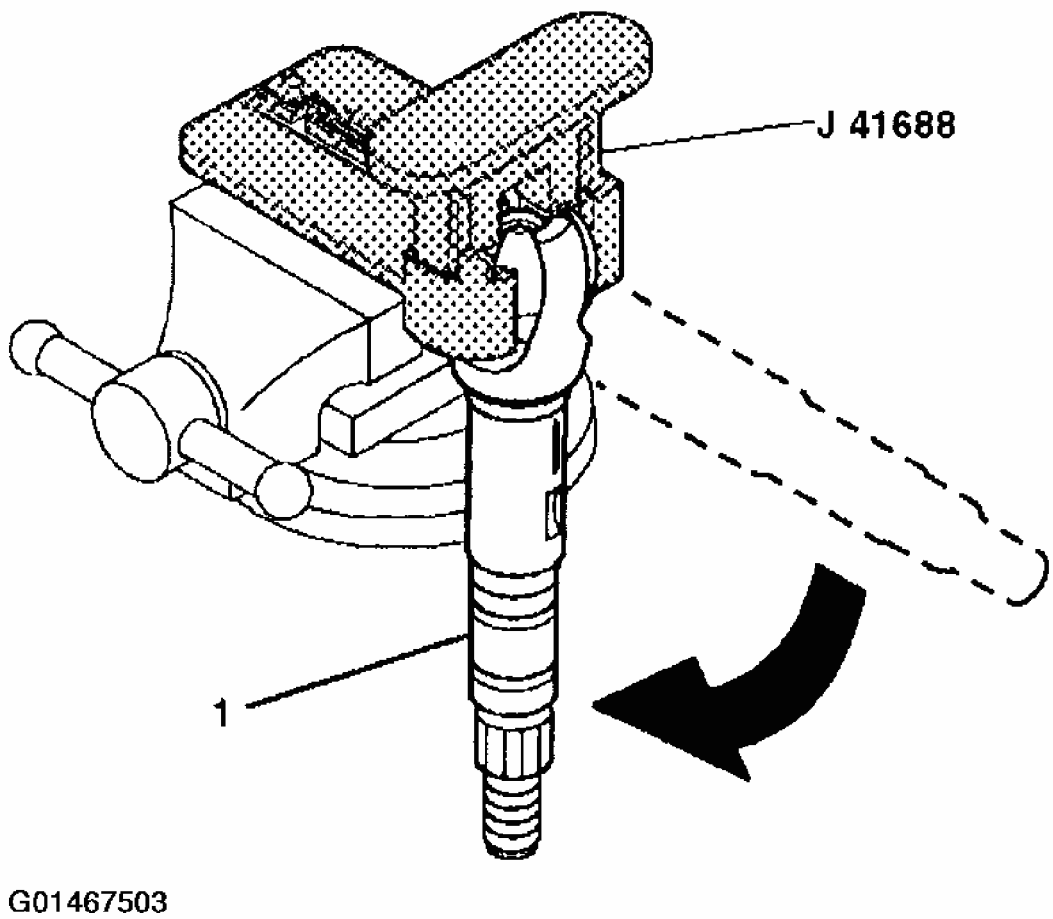


Fig. 117: Inserting Race & Upper Shaft Assembly Into SST For Removal
Courtesy of GENERAL MOTORS CORP.

25. Remove the 4 TORX(R) head screws (2) from the steering column support assembly (1).
26. Discard the 4 TORX(R) head screws.
27. Remove the steering column support assembly (1) from the steering column jacket assembly.

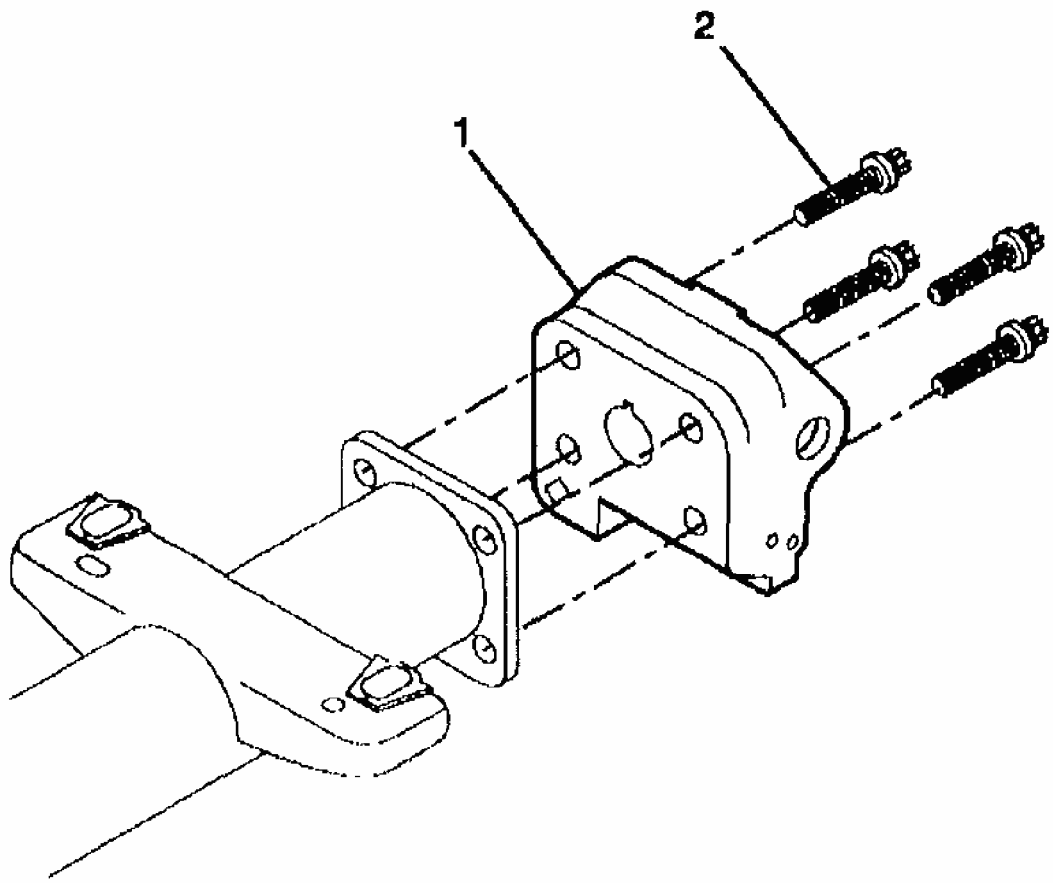


Fig. 118: Removing Steering Column Support Assembly From Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

Important: Replace the steering column support assembly (1) and the pivot pins if the steering column support assembly (1) and the pivot pins have been staked 3 times.

1. Attach the steering column support assembly (1) to the steering column jacket assembly (3) with the 4 TORX(R) head screws (2).

   Tighten

   Tighten the screws to 17 N.m (13 lb ft).

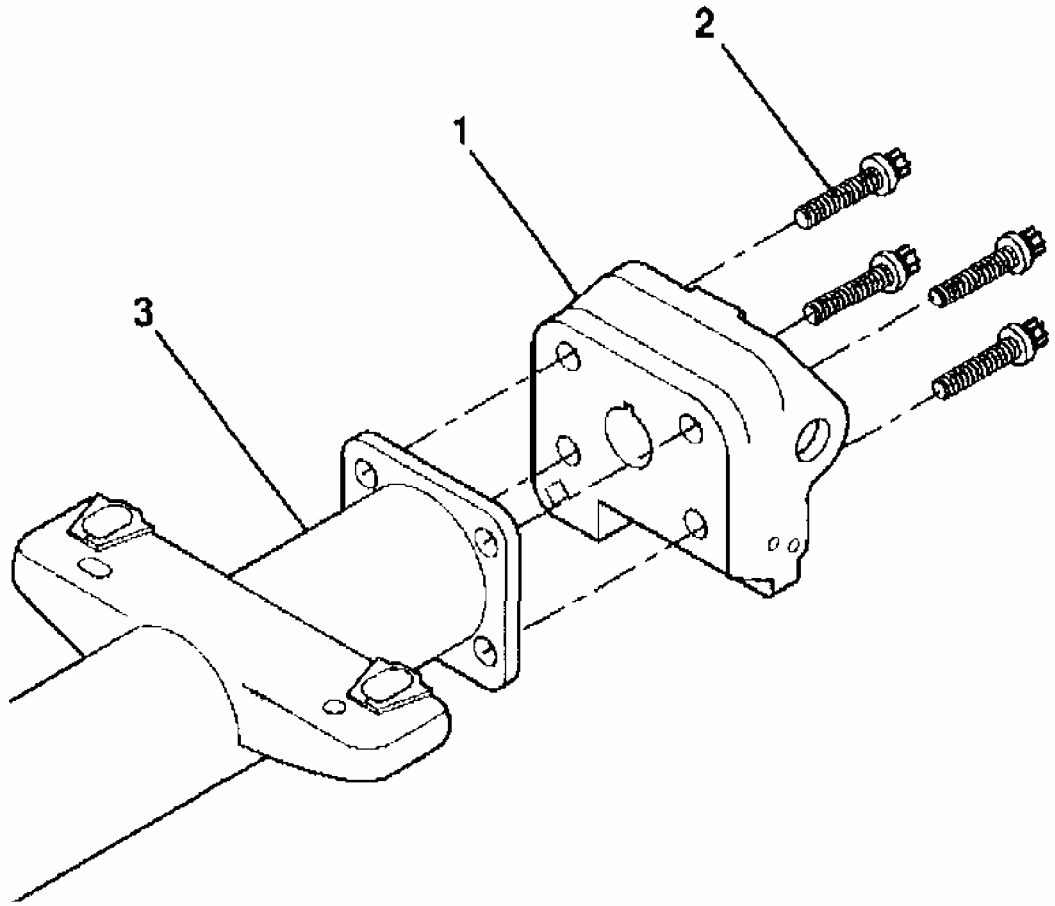


Fig. 119: Installing Steering Column Support Assembly Into Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

2. Lubricate the centering sphere (1) with GM P/N 12345718 (Canadian P/N 10953516).
3. Insert the centering sphere (1) and the joint preload spring (2) into *J 41688* .
4. Place the base of *J 41688* into a vise.

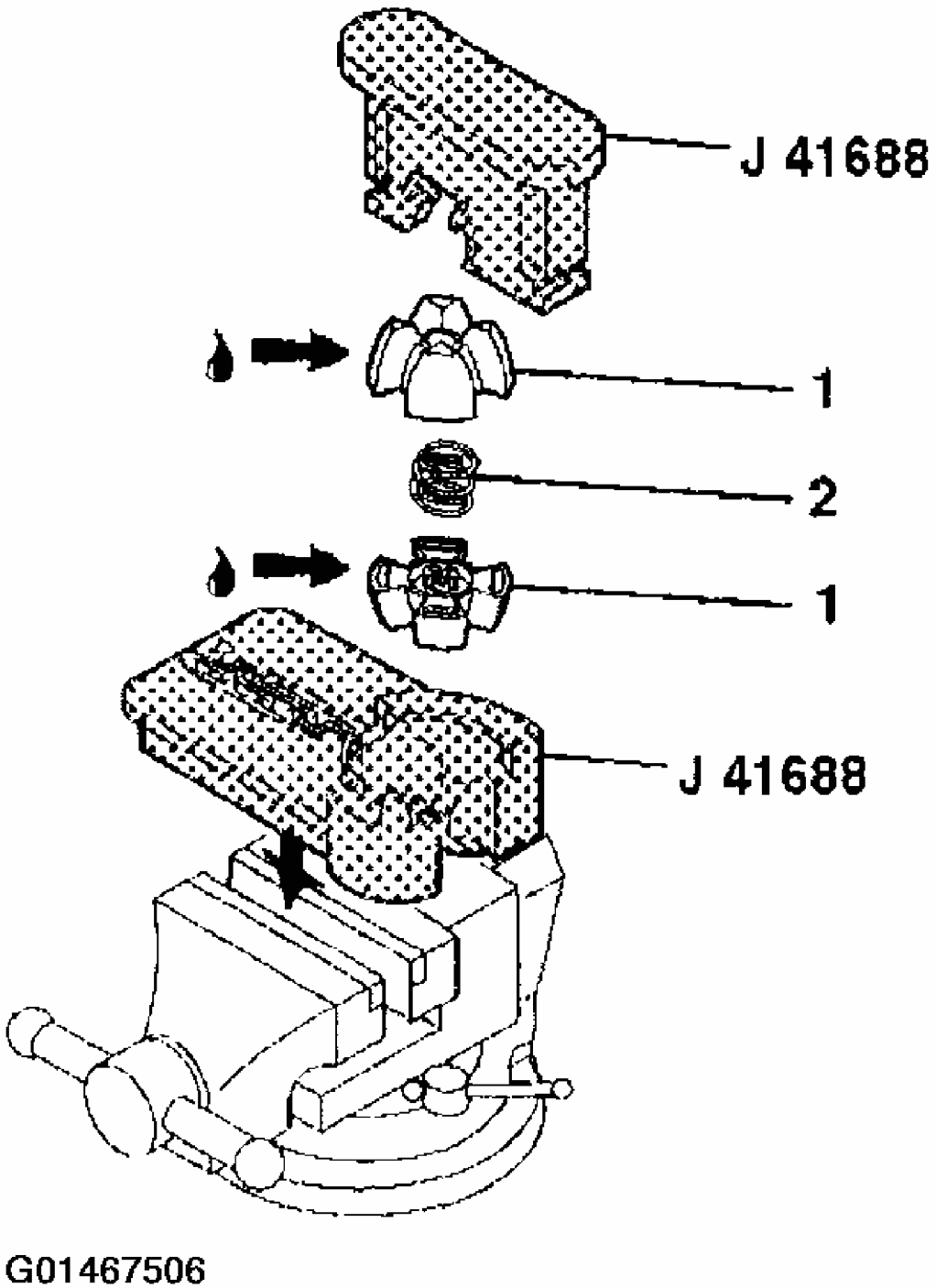


Fig. 120: Inserting Centering Sphere & Joint Preload Spring Into SST (J41688)
Courtesy of GENERAL MOTORS CORP.

5. Compress the centering sphere and the joint preload spring.

6. Rotate the driver 90 degrees in the clockwise direction until the arms lock in place.

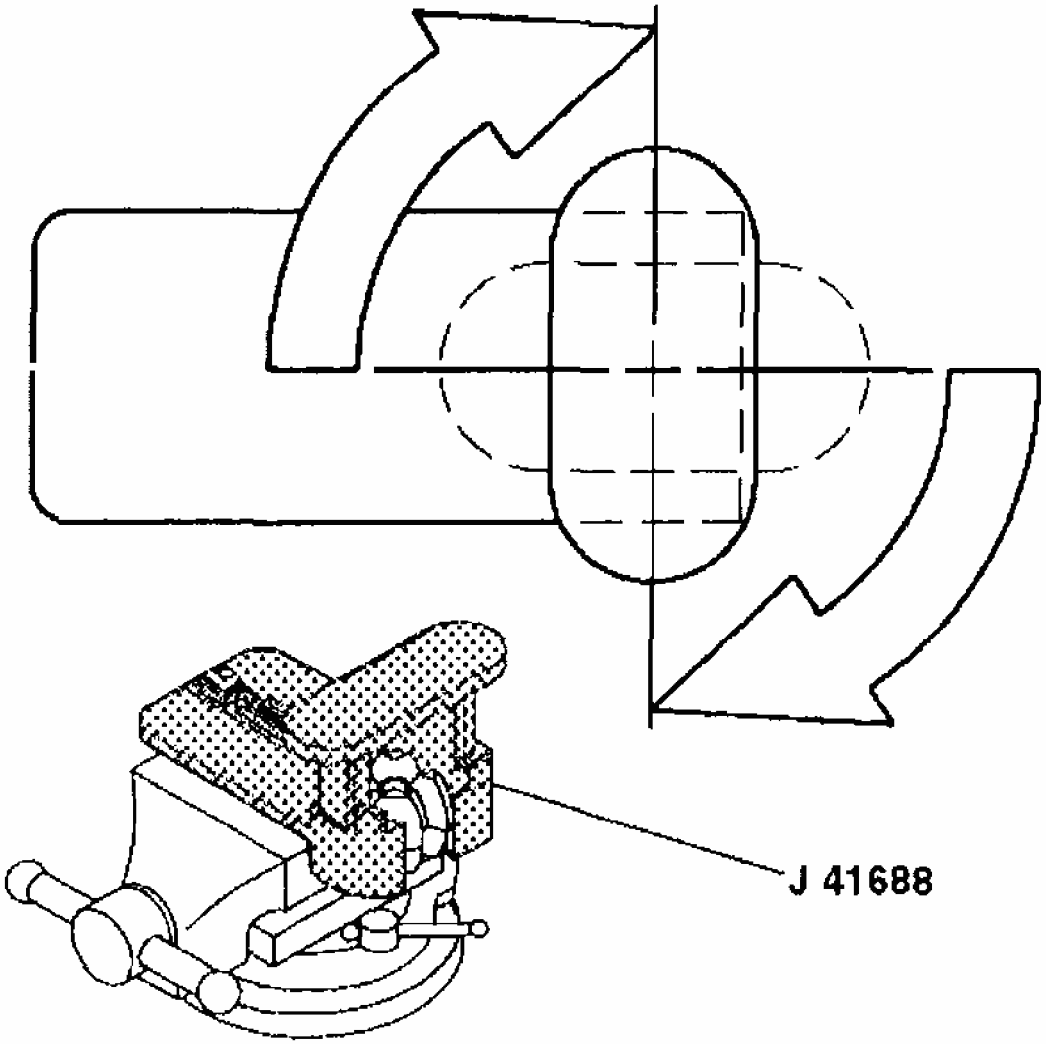


Fig. 121: Rotating Driver 90 Degrees In Clockwise Direction Until Arms Lock In Place
Courtesy of GENERAL MOTORS CORP.

7. Attach the race and upper shaft assembly (1) to *J 41688* .
8. Rotate the race and upper shaft assembly (1) downward 90 degrees until the centering sphere is locked in place.

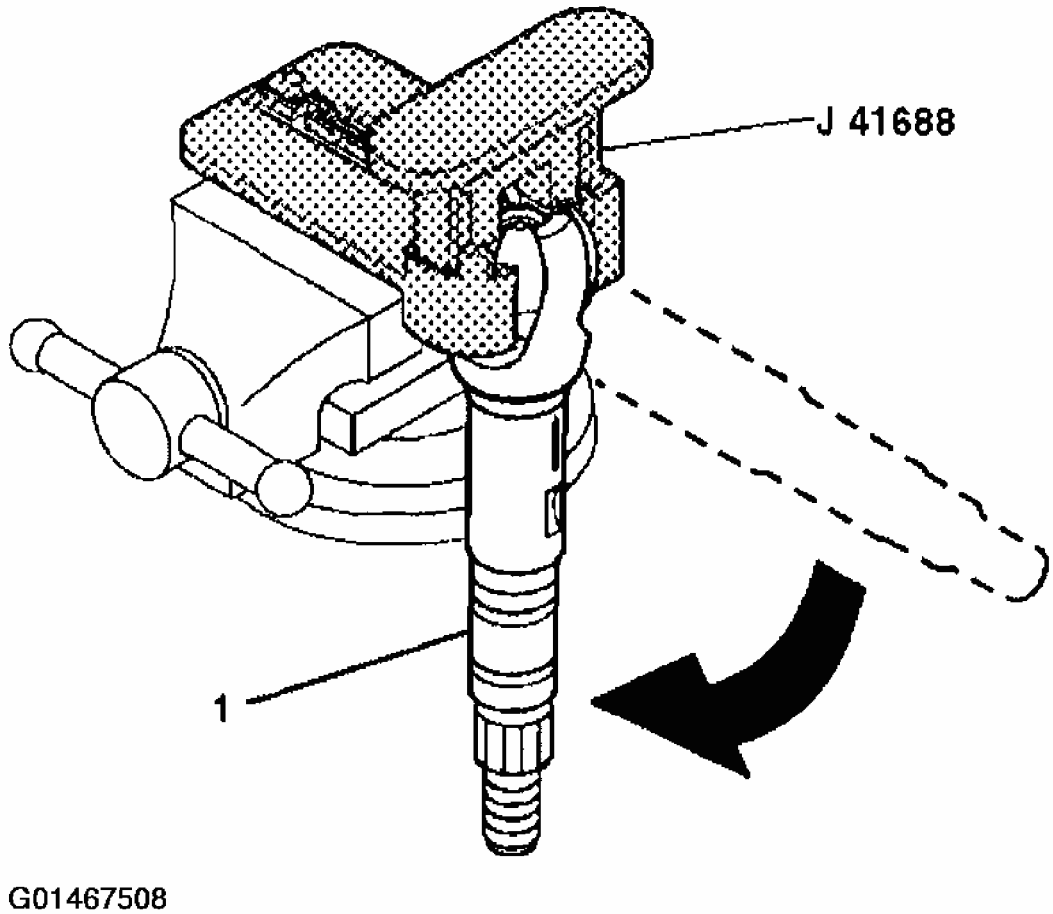


Fig. 122: Rotating Race & Upper Shaft Assembly Downward 90 Degrees Until Centering Sphere Is Locked In Place
Courtesy of GENERAL MOTORS CORP.

9. Remove the race and upper shaft assembly and *J 41688* from the vise.
10. Disassemble *J 41688* by separating the base.
11. Remove the race and upper shaft assembly, which is now attached to the centering sphere, from *J 41688* .

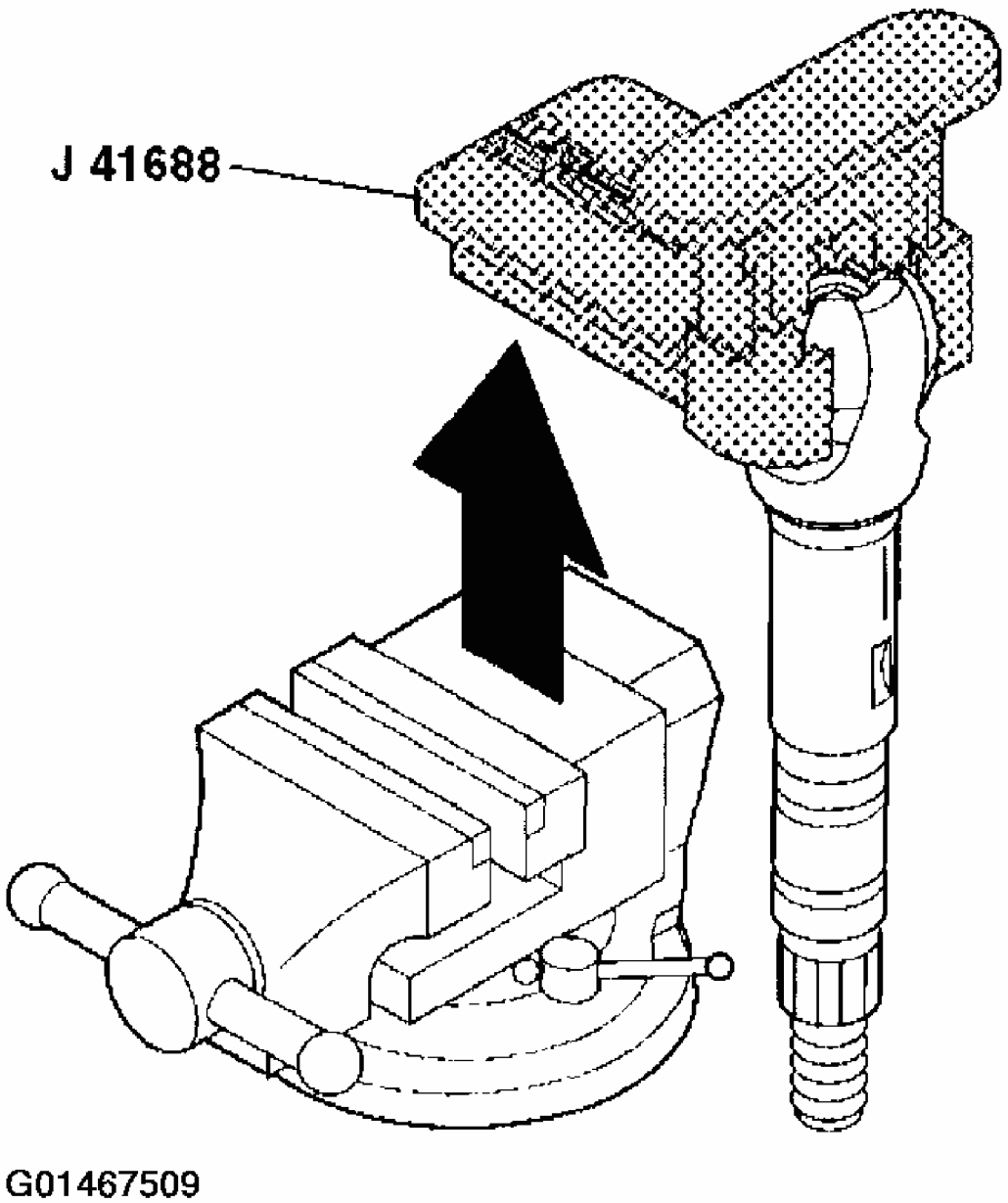


Fig. 123: Removing Race & Upper Shaft Assembly & SST (J41688) From Vise
Courtesy of GENERAL MOTORS CORP.

12. Lubricate the exposed steering shaft with GM P/N 12345718 (Canadian P/N 10953516).
13. Align the lower steering shaft assembly to the race and upper shaft assembly by using the marks.
14. Tilt the lower steering shaft assembly at 90 degrees to the race and upper shaft assembly.

15. Install the lower steering shaft assembly onto the race and upper shaft assembly.

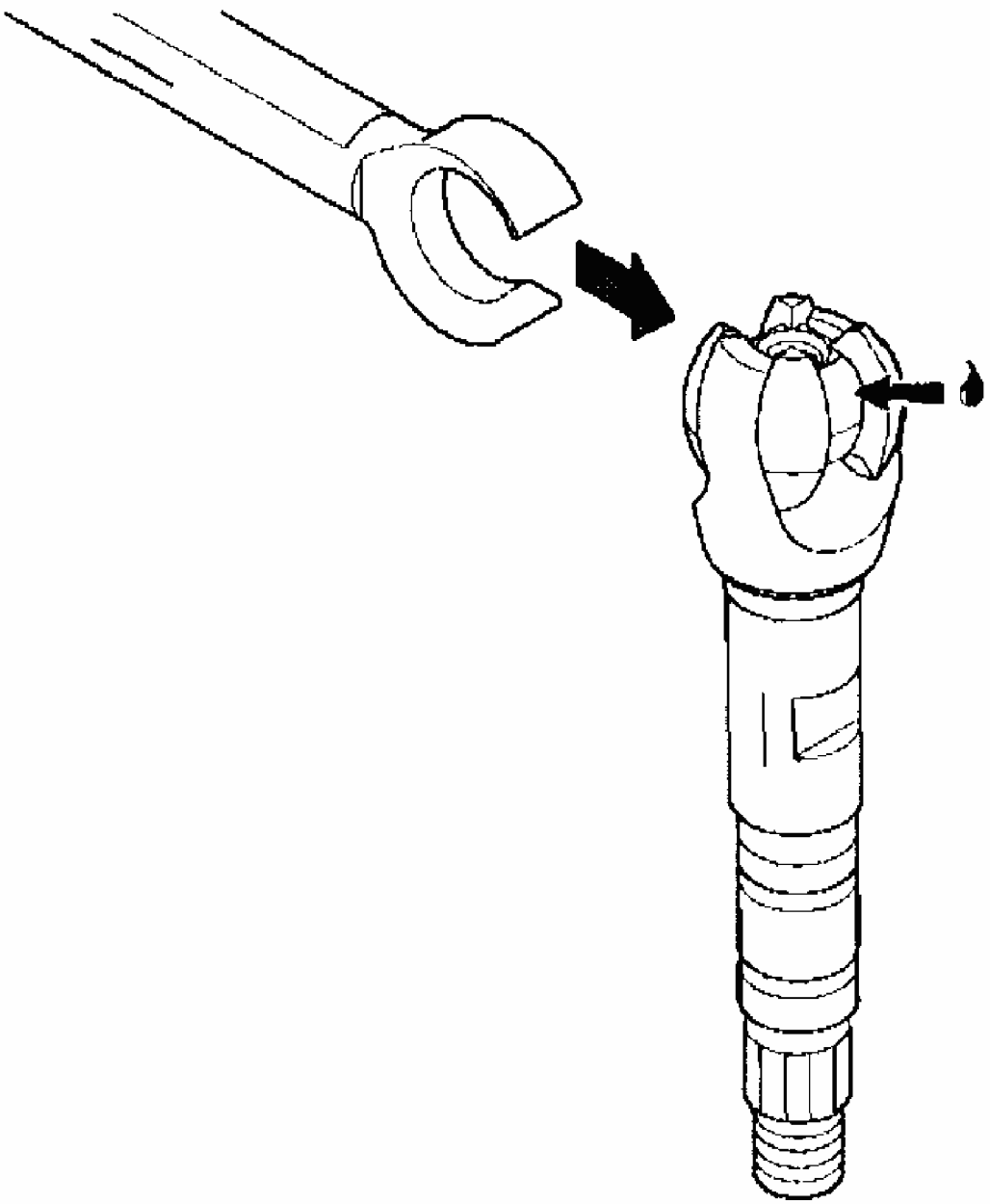


Fig. 124: Installing Lower Steering Shaft Assembly Onto Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

16. Install the steering shaft assembly (2) into the steering column tilt head assembly (1).

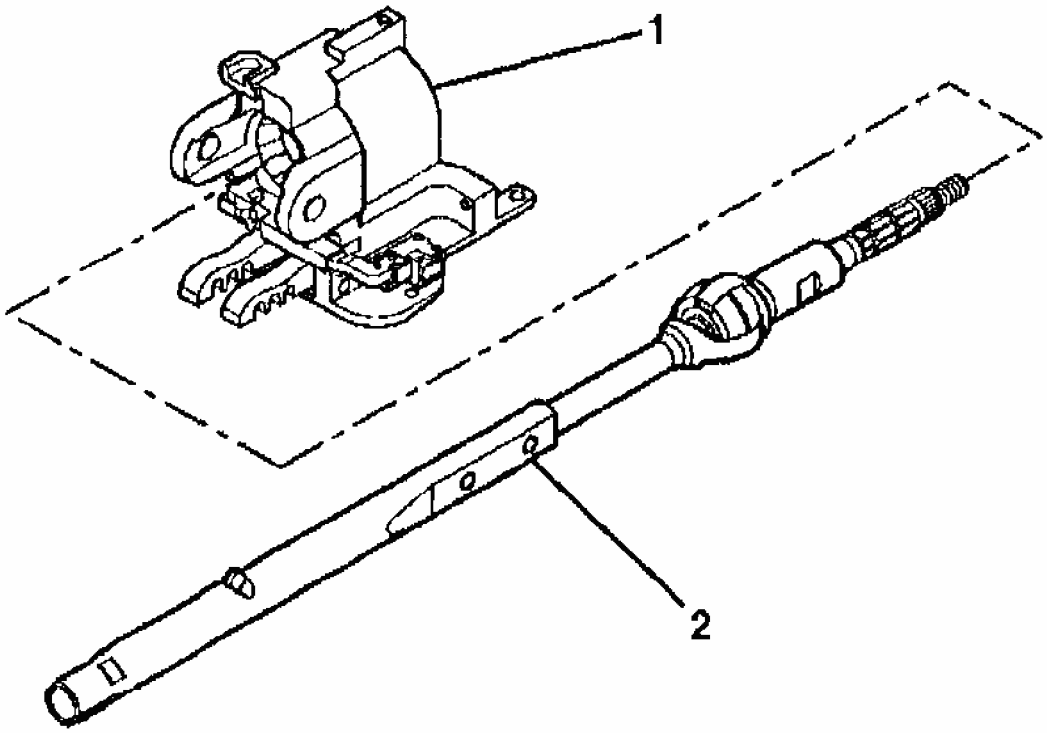


Fig. 125: Installing Steering Shaft Assembly Into Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

17. Install the steering shaft assembly with the tilt head assembly (1) into the steering column jacket assembly (2).
18. Maneuver the tilt lever and push the tilt head assembly (1) up towards the steering column in order to lock the steering wheel lock shoes in place.

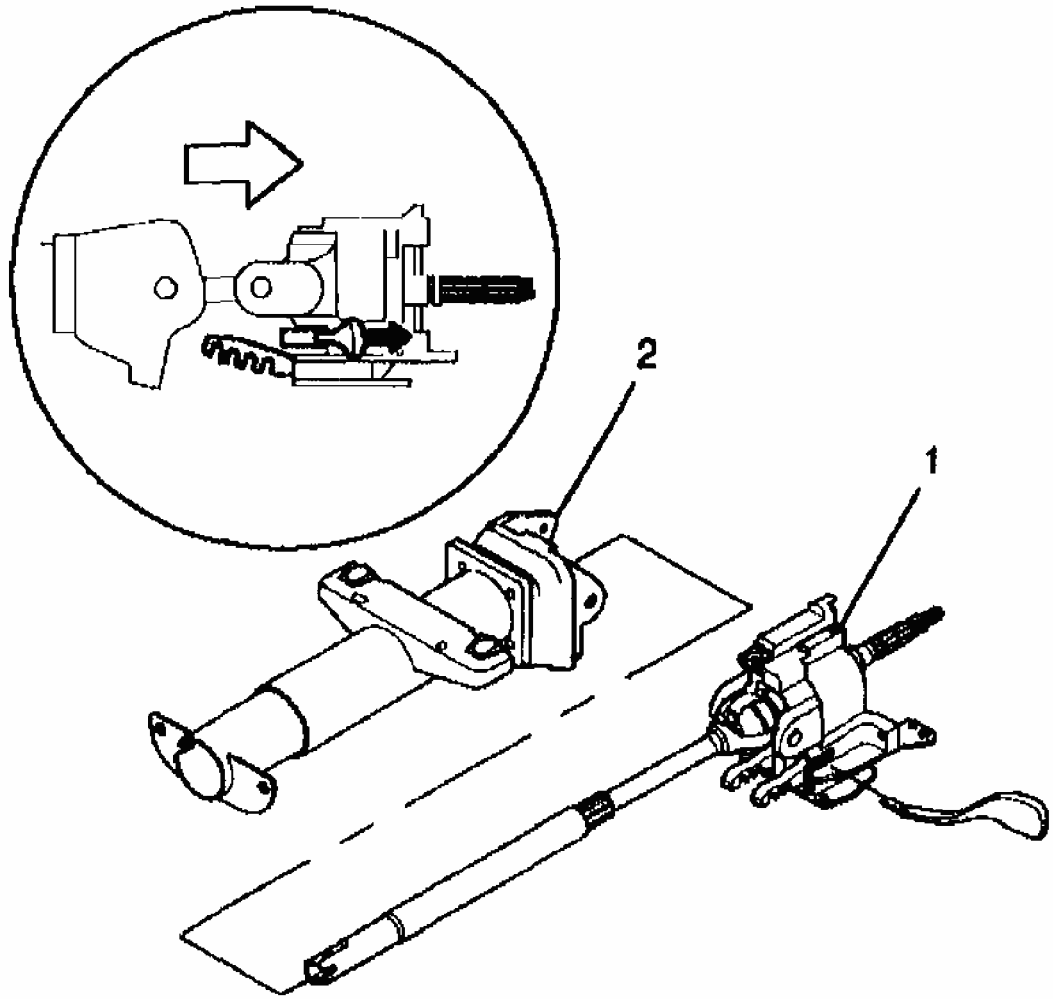


Fig. 126: Installing Steering Shaft Assembly With Tilt Head Assembly Into Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

19. Lubricate the pivot pins (1) with GM P/N 12346293 (Canadian P/N 992723).
20. Firmly seat each pivot pin (1) into the tilt head assembly.
21. Stake the steering column support assembly in the 3 locations around each pivot pin.

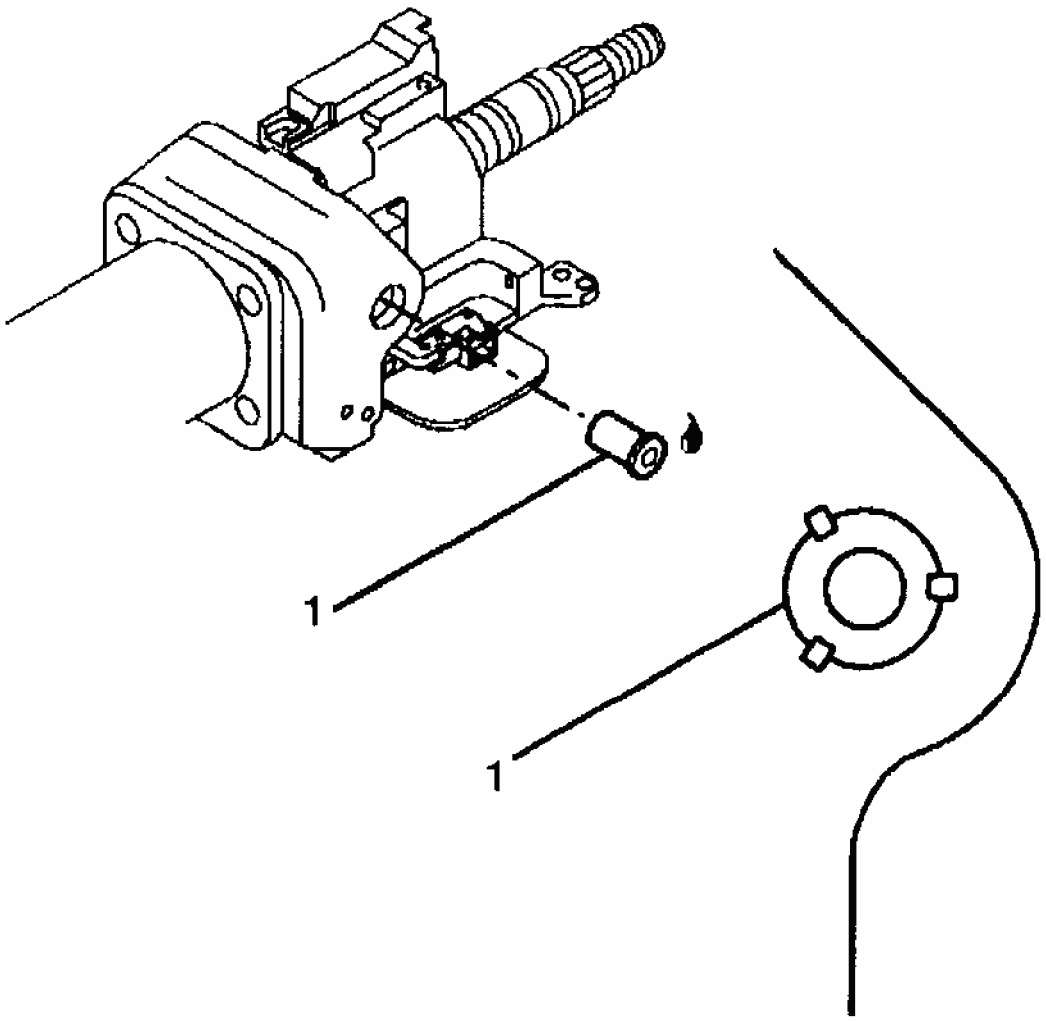


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Fig. 127: Installing Pivot Pin Into Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

22. Install the adapter and bearing assembly (1) onto the steering column jacket assembly by performing the following procedure:
    22.1. Align the tab on the adapter and bearing assembly (1) with the slot in the steering column jacket assembly.
    22.2. Push the adapter and bearing assembly (1) onto the steering shaft assembly until the tab snaps into the slot.
23. Install the shaft seal retainer (2) onto the adapter and bearing assembly (1).
    23.1. Align the slots of the shaft seal retainer (2) to the ribs of the adapter and bearing assembly (1).

23.2. Push the shaft seal retainer (2) onto the steering shaft assembly so that the retainer (2) contacts the adapter and bearing assembly (1).

24. Install the steering shaft seal (3) onto the steering shaft assembly.
25. Install the inner boot seal (4) onto the steering shaft assembly.

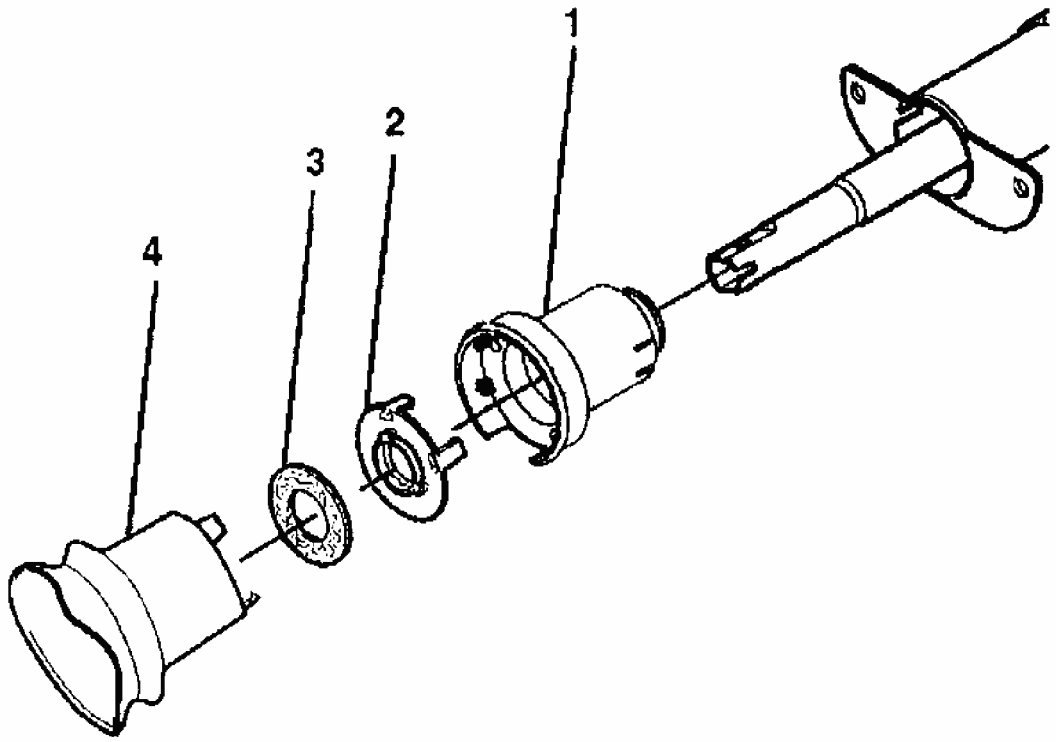


Fig. 128: Installing Adapter & Bearing Assembly Onto Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

26. Install the linear shift assembly onto the steering column support assembly.
27. Secure the linear shift assembly with the 3 flat head tapping screws.

Move the linear shift assembly out of the PARK position to install the lower socket tapping screw.

Tighten

Tighten the tapping screws to 10 N.m (89 lb in).

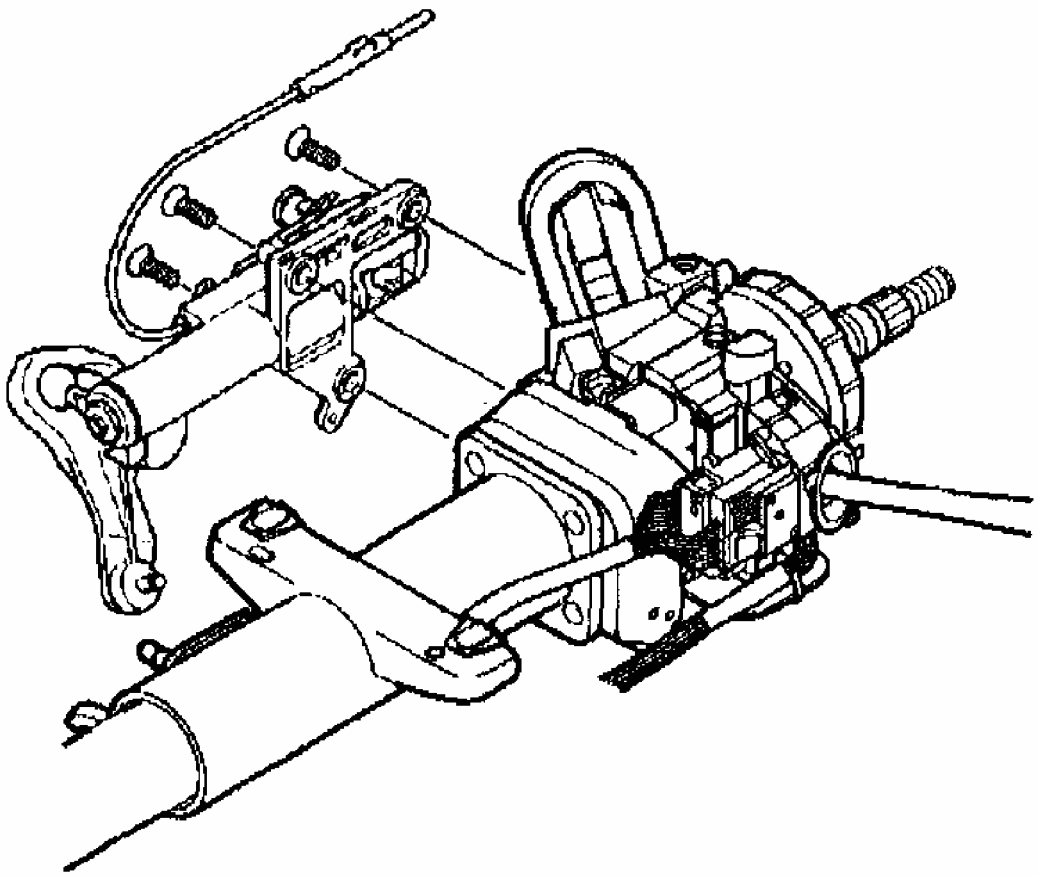
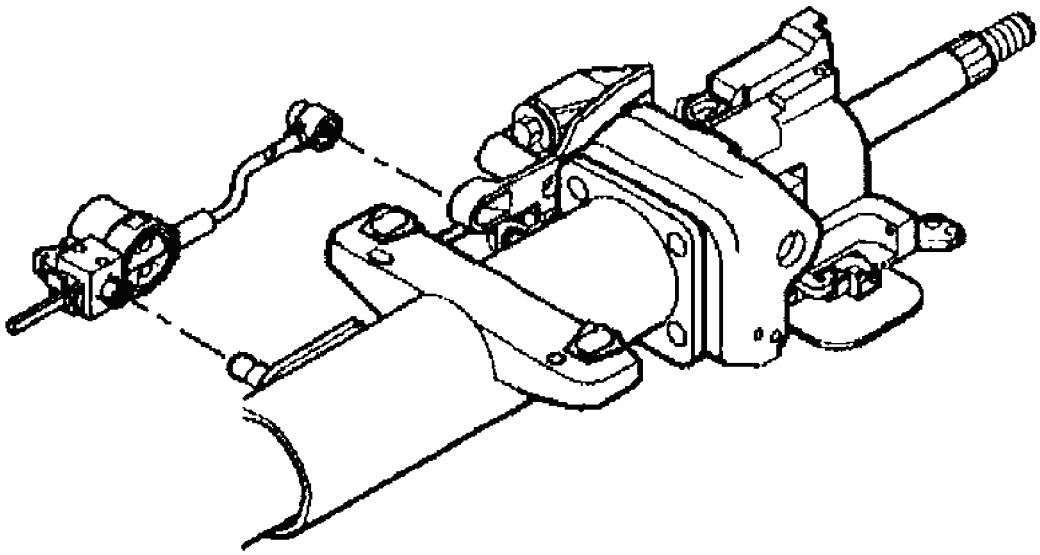


Fig. 129: Installing Linear Shift Assembly Onto Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

28. Install the A/T shift lock control.
29. Put the shift lever clevis into the NEUTRAL position.



G01467516

Fig. 130: A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

30. Adjust the A/T shift lock control by performing the following steps:
    30.1. Pull out the tab (1) on the adjuster block (2) side of the A/T shift lock control.
    30.2. Press on the adjuster block (2) to compress the internal adjuster spring which disengages the adjuster teeth.
    30.3. Slide the adjuster block (2) as far away from the solenoid as possible.
    30.4. Push inward on the tab (1) in order to lock the adjuster block (2) in place.

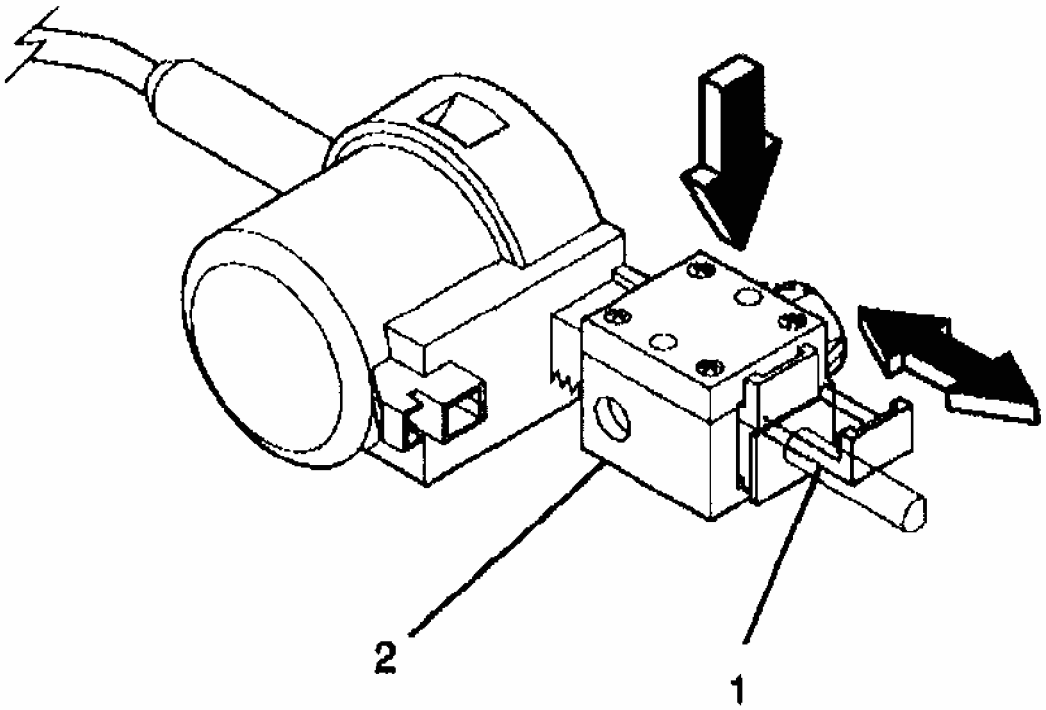


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Fig. 131: Adjusting A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

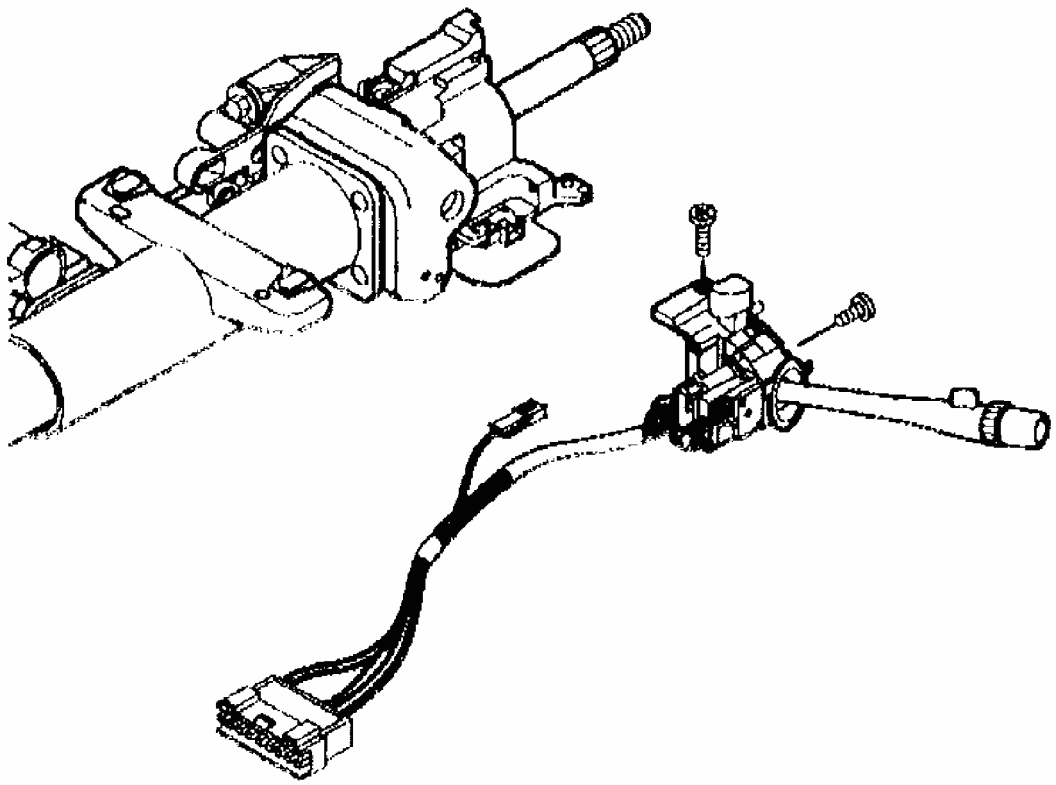

Fig. 132: Shift Lever Assembly
Courtesy of GENERAL MOTORS CORP.

31. Remove the 2 pan head tapping screws (1) from the turn signal and multifunction switch assembly (2).
32. Remove the turn signal and multifunction switch assembly (2).

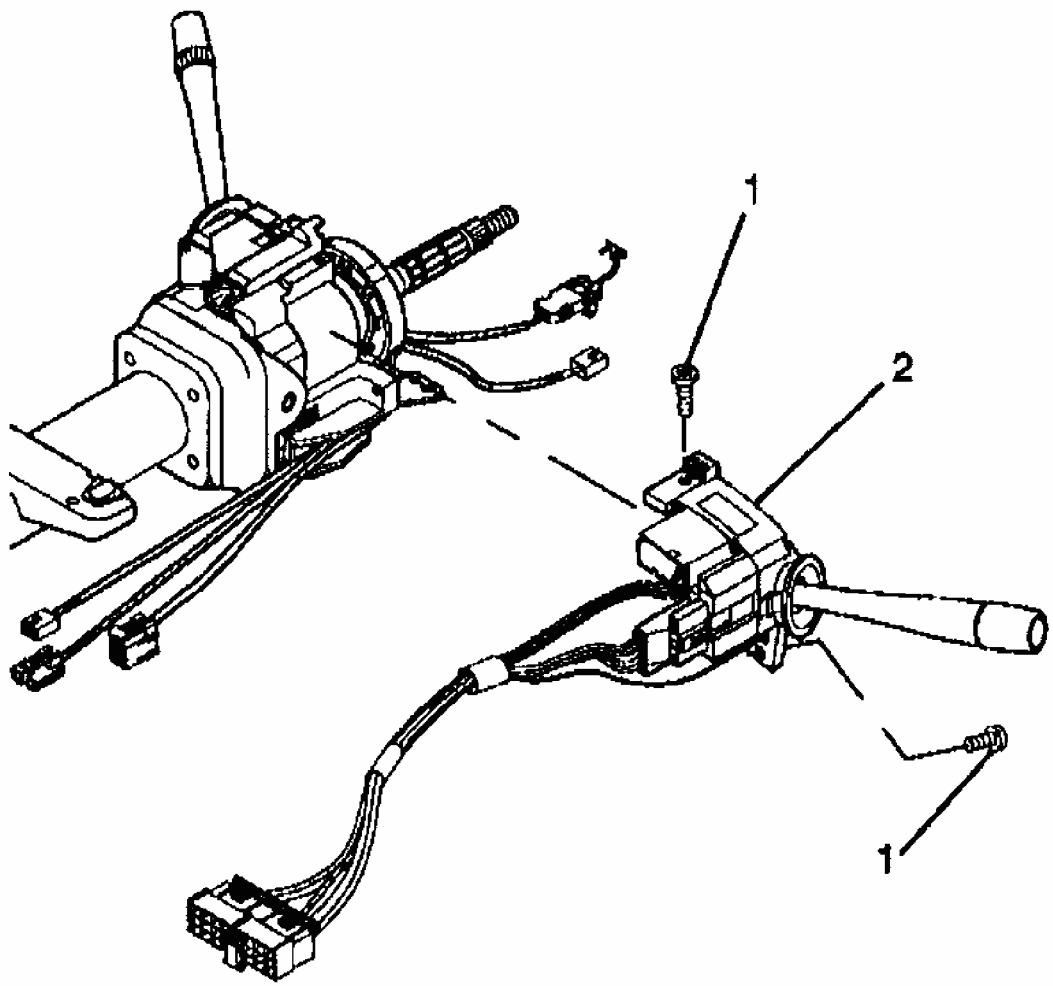

Fig. 133: Removing Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

33. Remove the inner boot seal (4).
34. Remove the steering shaft seal (3) from the adapter and bearing assembly (1).
35. Remove the shaft seal retainer (2) from the adapter and bearing assembly (1).
36. Remove the adapter and bearing assembly (1) from the steering shaft assembly.

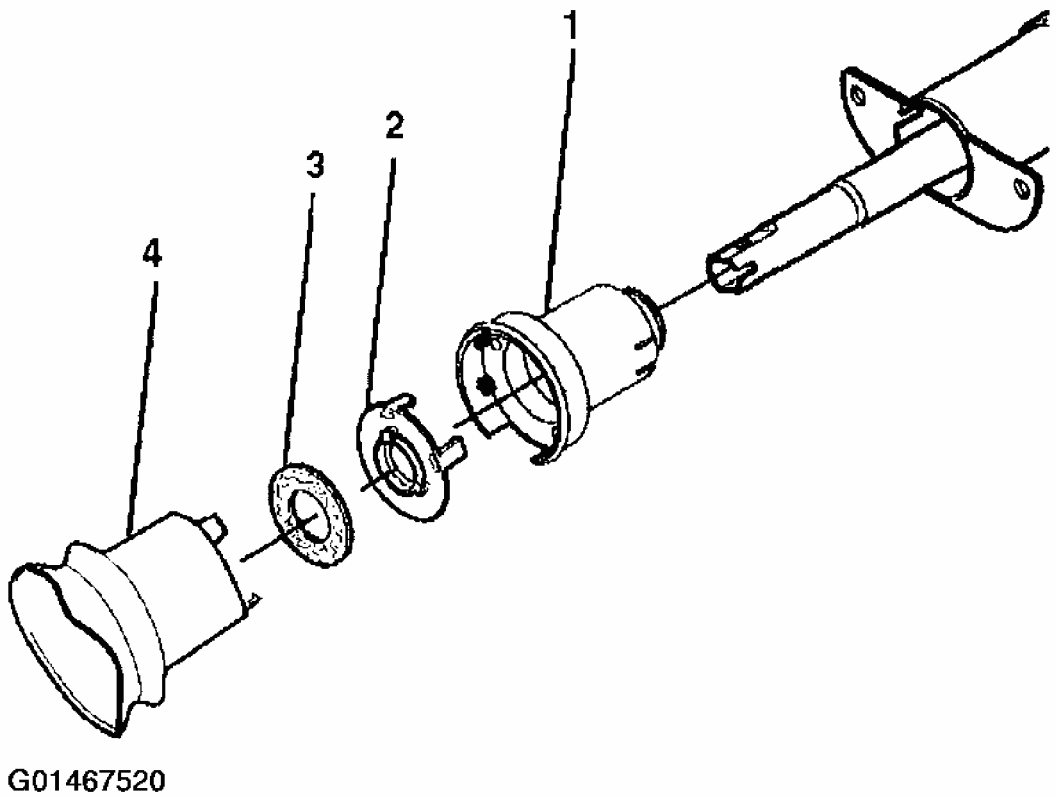

Fig. 134: Removing Adapter & Bearing Assembly From Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

37. Remove the 2 pivot pins (3) from the steering column tilt head assembly (1) by using *J 21854-01* .

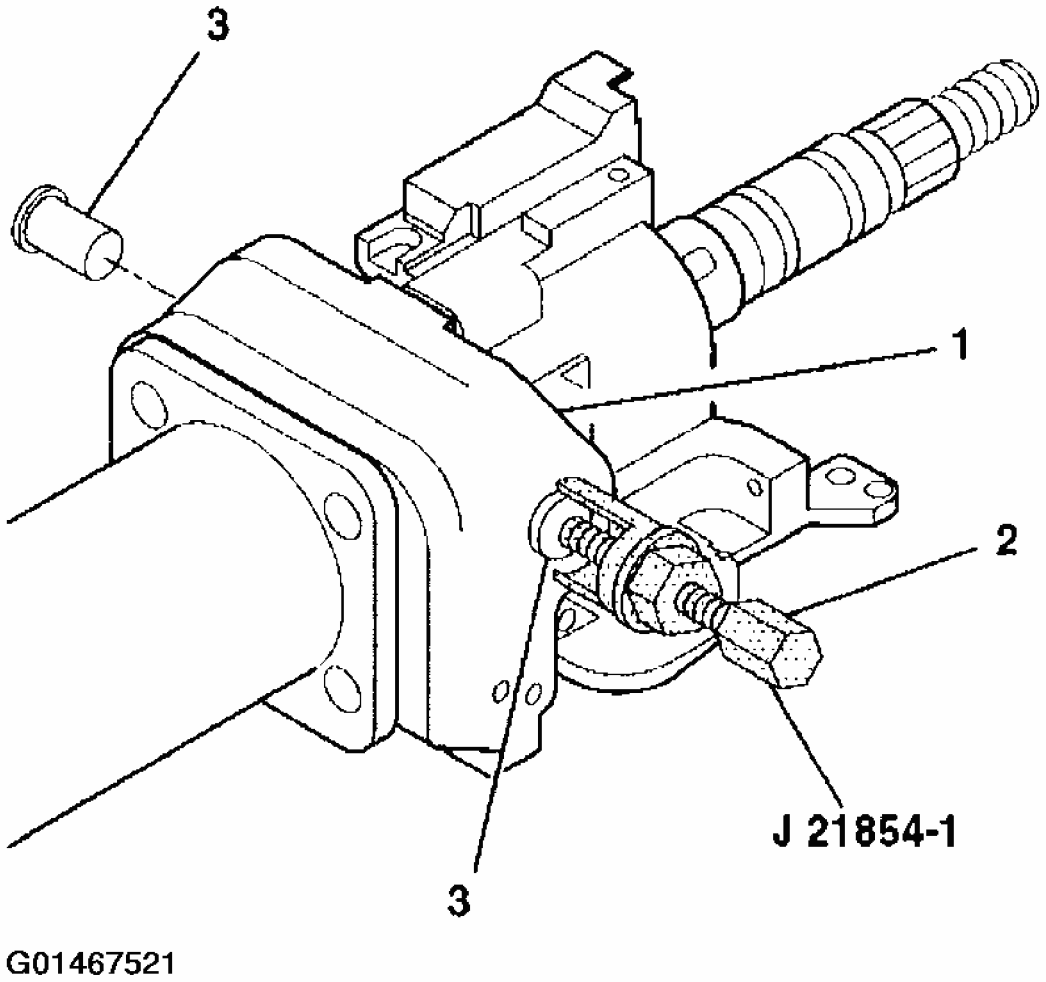

Fig. 135: Removing Pivot Pins From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

38. Install the tilt lever into the steering column tilt head assembly (1).
39. Pull back on the tilt lever and at the same time pull the steering column tilt head assembly (1) down and away from the steering column.
40. Remove the tilt head assembly (1) and the steering shaft assembly from the steering column support assembly (2).
41. Remove the tilt lever.

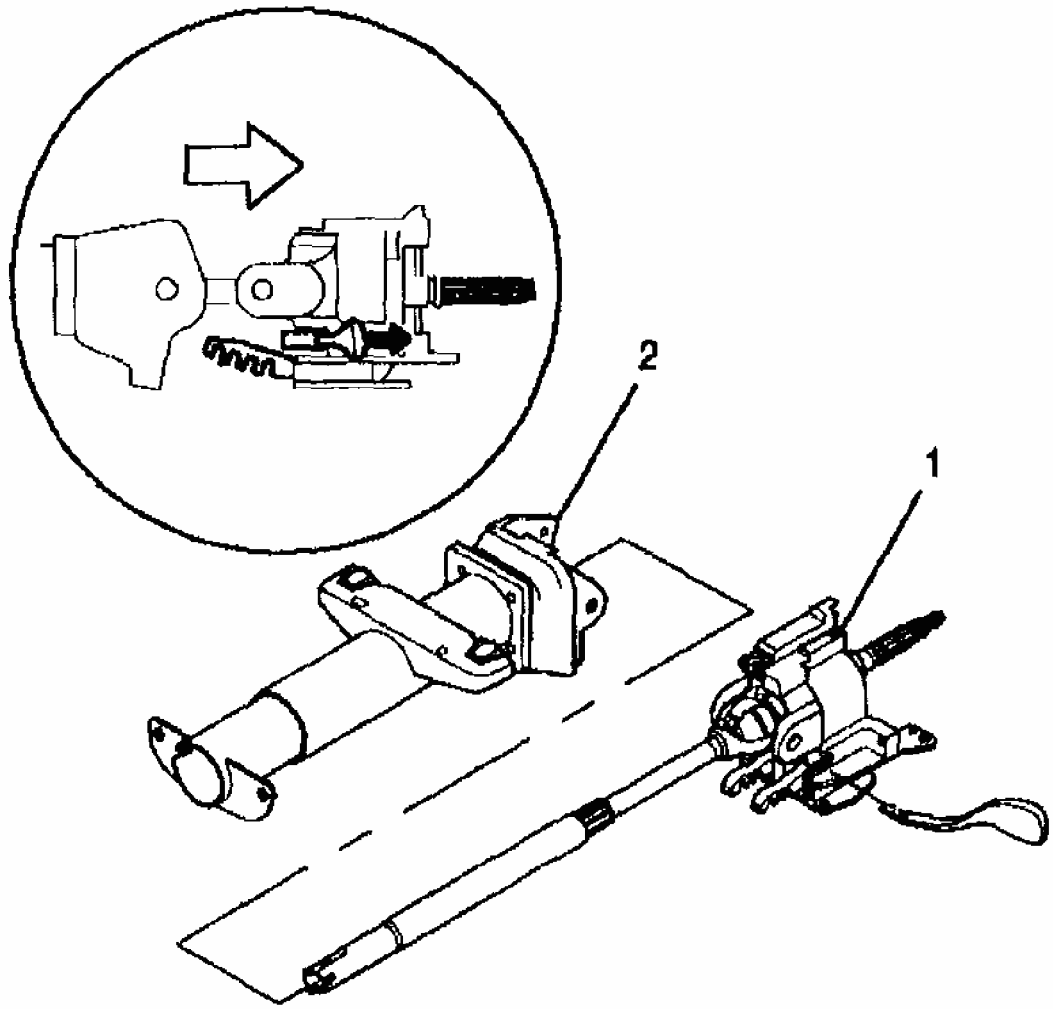

Fig. 136: Removing Tilt Head Assembly & Steering Shaft Assembly From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

42. Remove the steering shaft assembly (2) from the steering column tilt head assembly (1).

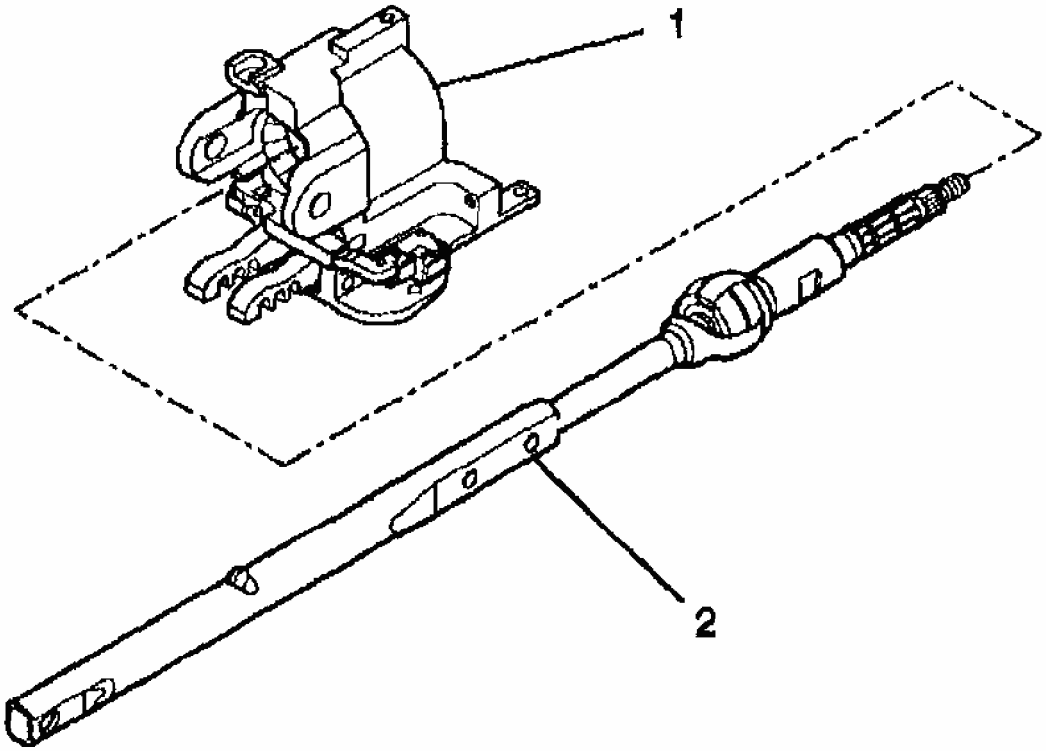

Fig. 137: Removing Steering Shaft Assembly From Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

Important: Mark the race and upper shaft assembly and the lower shaft assembly before disassembly. Failure to assemble the race and upper shaft assembly and the lower shaft assembly correctly will cause the steering wheel to be turned 180 degrees.

43. Tilt the race and upper shaft assembly (1) 90 degrees to the lower shaft assembly (2).
44. Disengage the race and upper shaft assembly (1) from the lower shaft assembly (2).

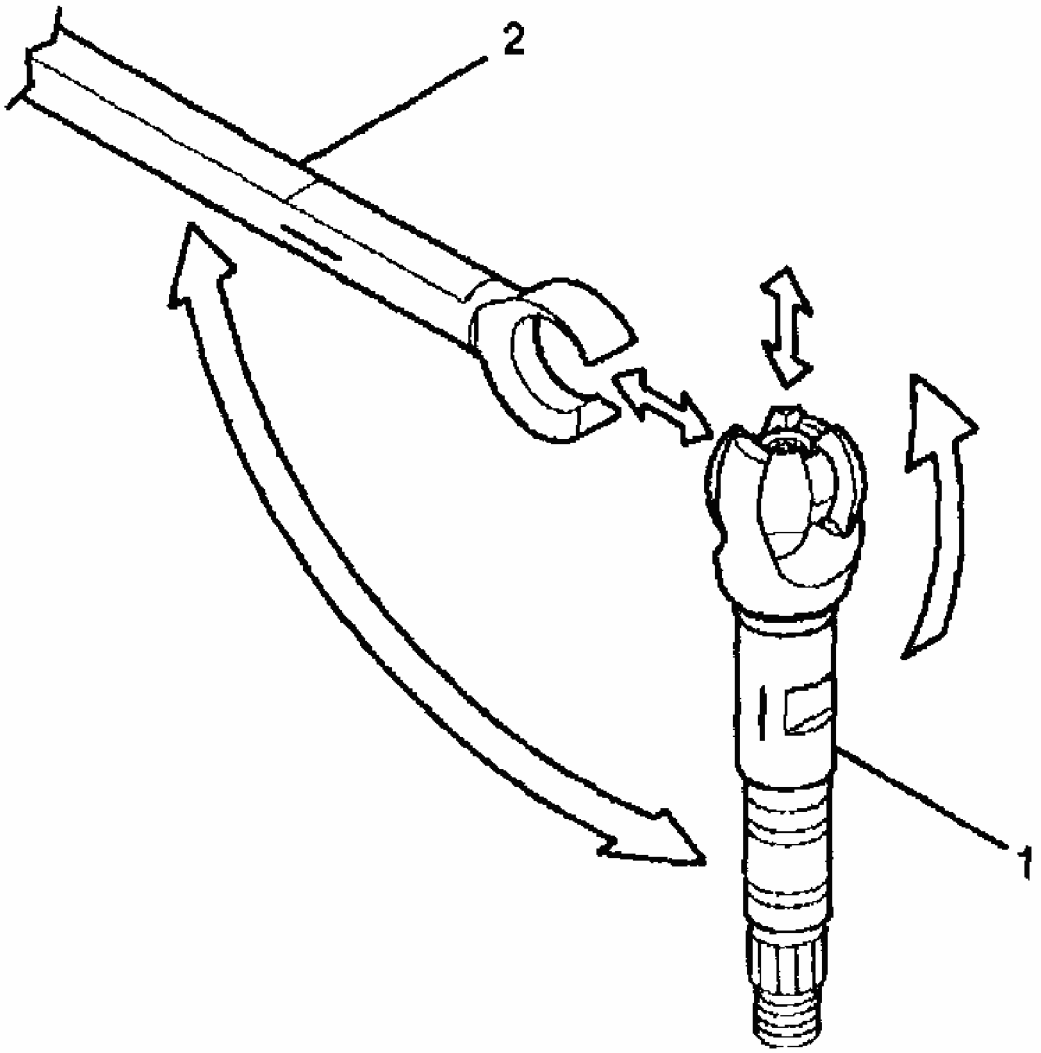

Fig. 138: Disengaging Race & Upper Shaft Assembly From Lower Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

45. Insert the race and upper shaft assembly (1) into *J 41688* .
46. Insert *J 41688* into a vise.
47. Rotate the driver 90 degrees in the counterclockwise direction in order to disengage the centering sphere from the race and upper shaft assembly.
48. Remove the race and upper shaft assembly from *J 41688* .
49. Remove the shaft preload spring and the centering sphere from *J 41688* .
50. If necessary, discard the old centering sphere and the old shaft preload spring.

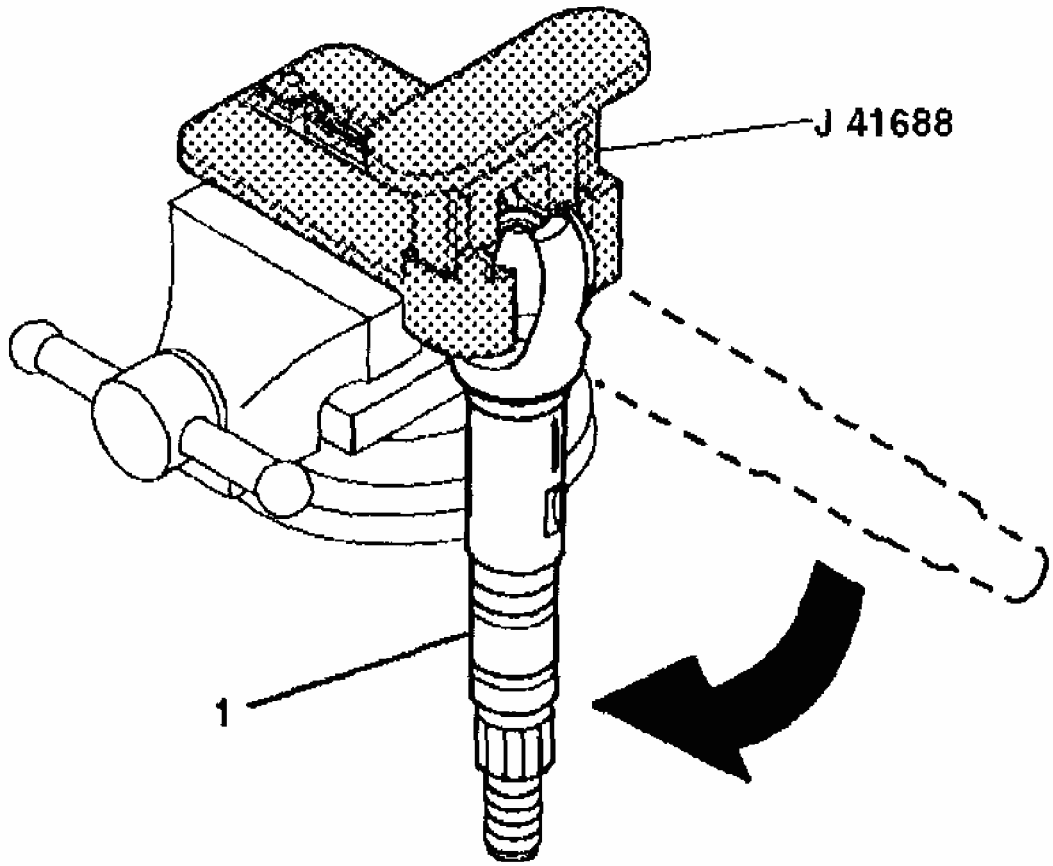

Fig. 139: Rotating Driver 90 Degrees Counterclockwise For Removing Centering Sphere From Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

51. Remove the 4 TORX(R) head screws (2) from the steering column support assembly (1).
52. Discard the 4 TORX(R) head screws.
53. Remove the steering column support assembly (1) from the steering column jacket assembly.

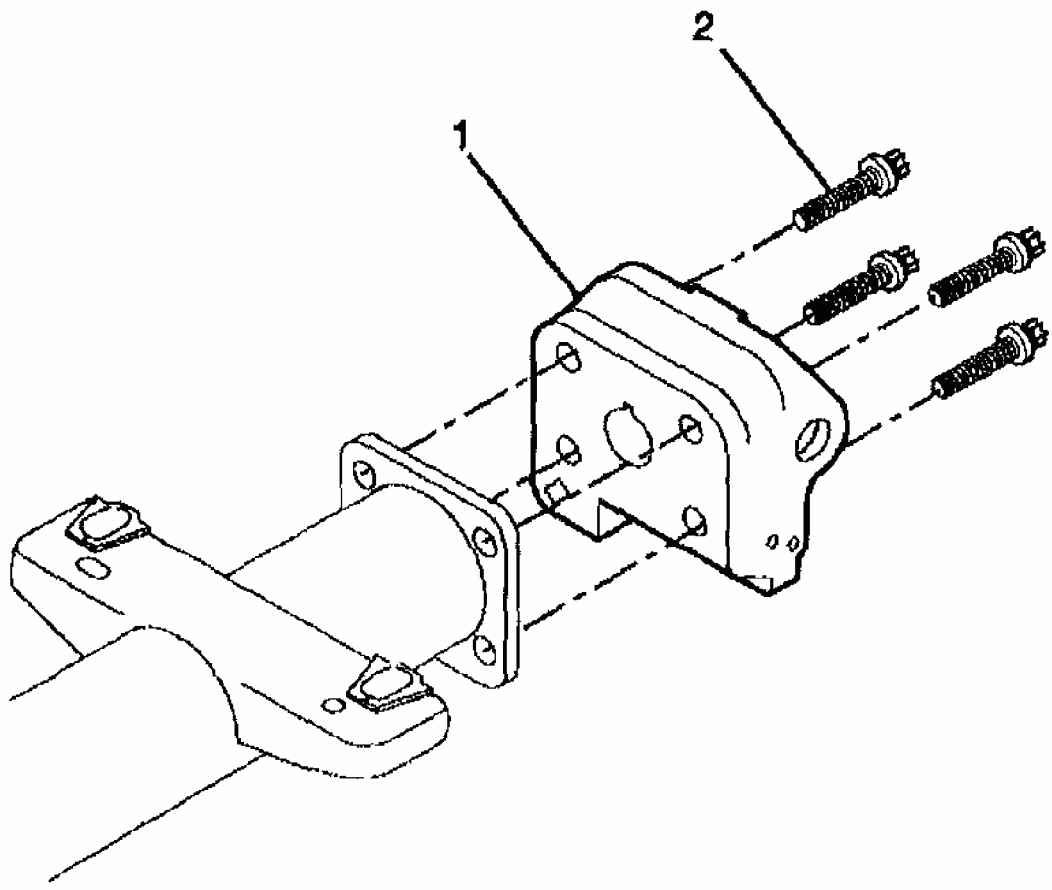

Fig. 140: Removing Steering Column Support Assembly From Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

Important: Replace the steering column support assembly and the pivot pins if the steering column support assembly and the pivot pins have been staked 3 times.

1. Attach the steering column support assembly (1) to the jacket assembly with 4 NEW TORX(R) head screws (2).

   Tighten

   Tighten the screws to 17 N.m (13 lb ft).

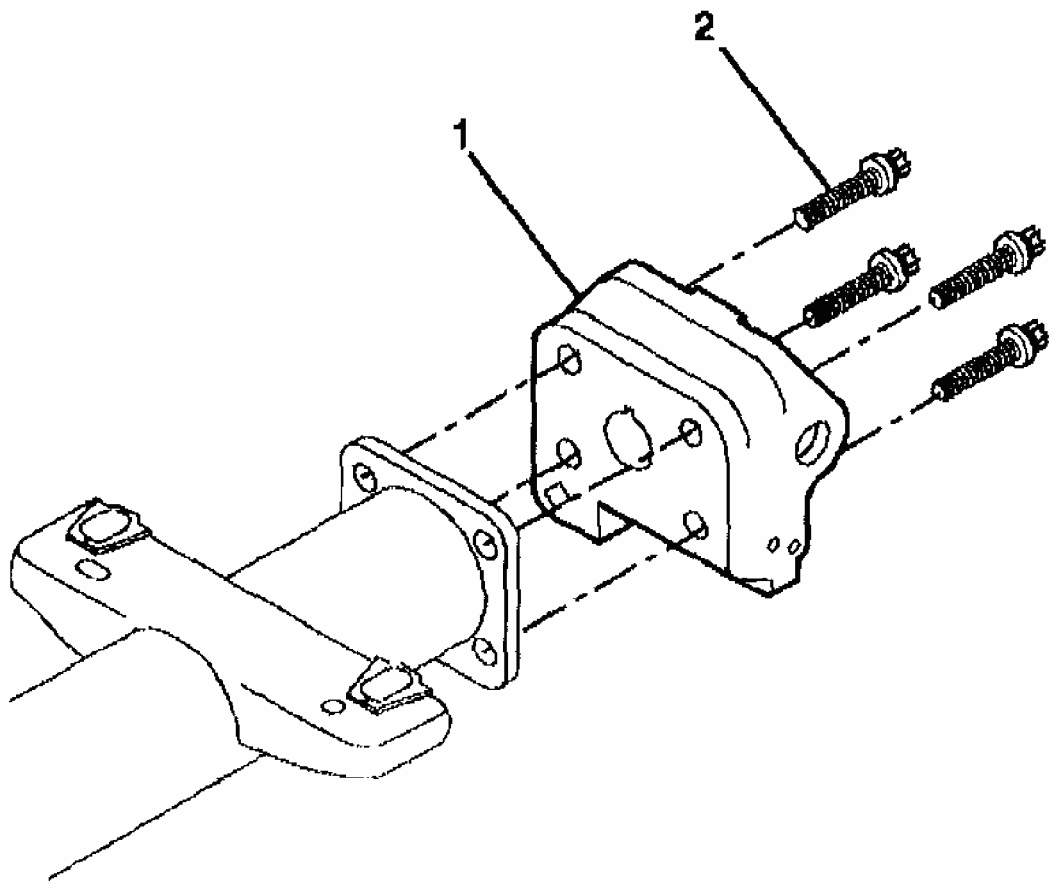

Fig. 141: Installing Steering Column Support Assembly To Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

2. Lubricate the centering sphere (1) with GM P/N 12345718 (Canadian P/N 10953516).
3. Install the centering sphere (1) and the joint preload spring (2) by using *J 41688* .
4. Place the base of *J 41688* into a vise.

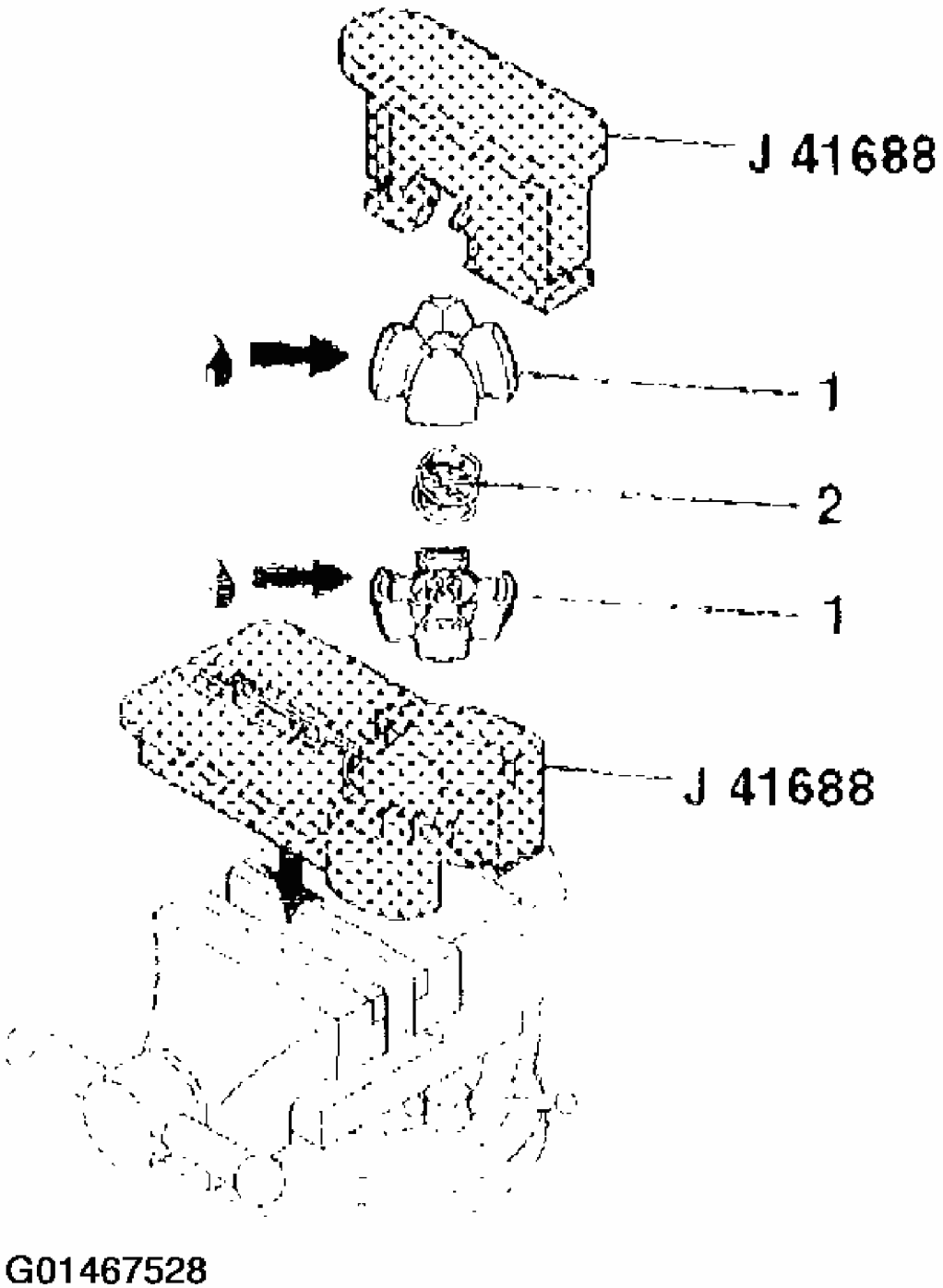

Fig. 142: Installing Centering Sphere & Joint Preload Spring Into Vise
Courtesy of GENERAL MOTORS CORP.

5. Compress the centering sphere and the joint preload spring.

6. Rotate the driver 90 degrees in the clockwise direction until the arms lock in place.

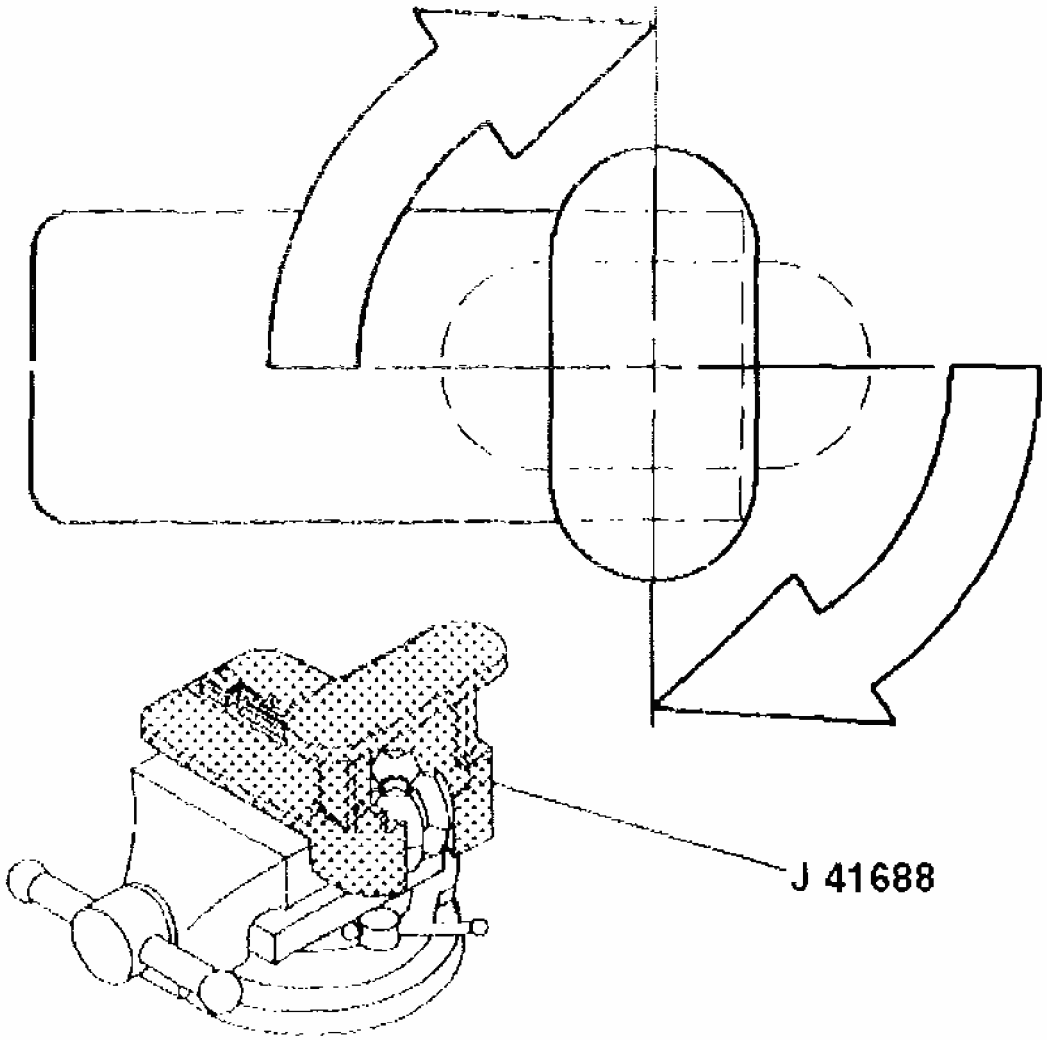

Fig. 143: Rotating Driver 90 Degrees In Clockwise Direction Until Arms Lock In Place
Courtesy of GENERAL MOTORS CORP.

7. Attach the race and upper shaft assembly (1) to the centering sphere.
8. Rotate the race and upper shaft assembly (1) downward 90 degrees until the centering sphere is locked in place.

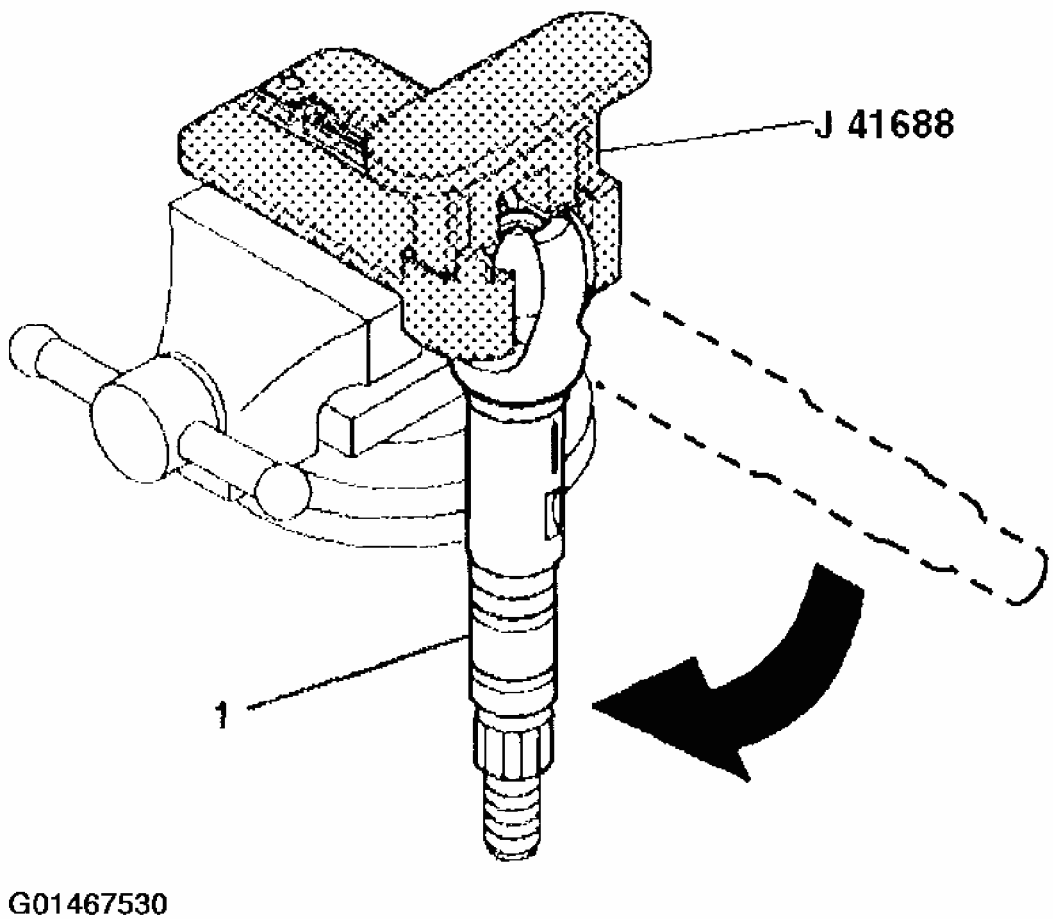

Fig. 144: Rotating Race & Upper Shaft Assembly Downward 90 Degrees Until Centering Sphere Is Locked In Place
Courtesy of GENERAL MOTORS CORP.

9. Remove the race and upper shaft assembly and *J 41688* from the vise.
10. Disassemble *J 41688* by separating the base.
11. Remove the race and upper shaft assembly, which is now attached to the centering sphere, from *J 41688* .

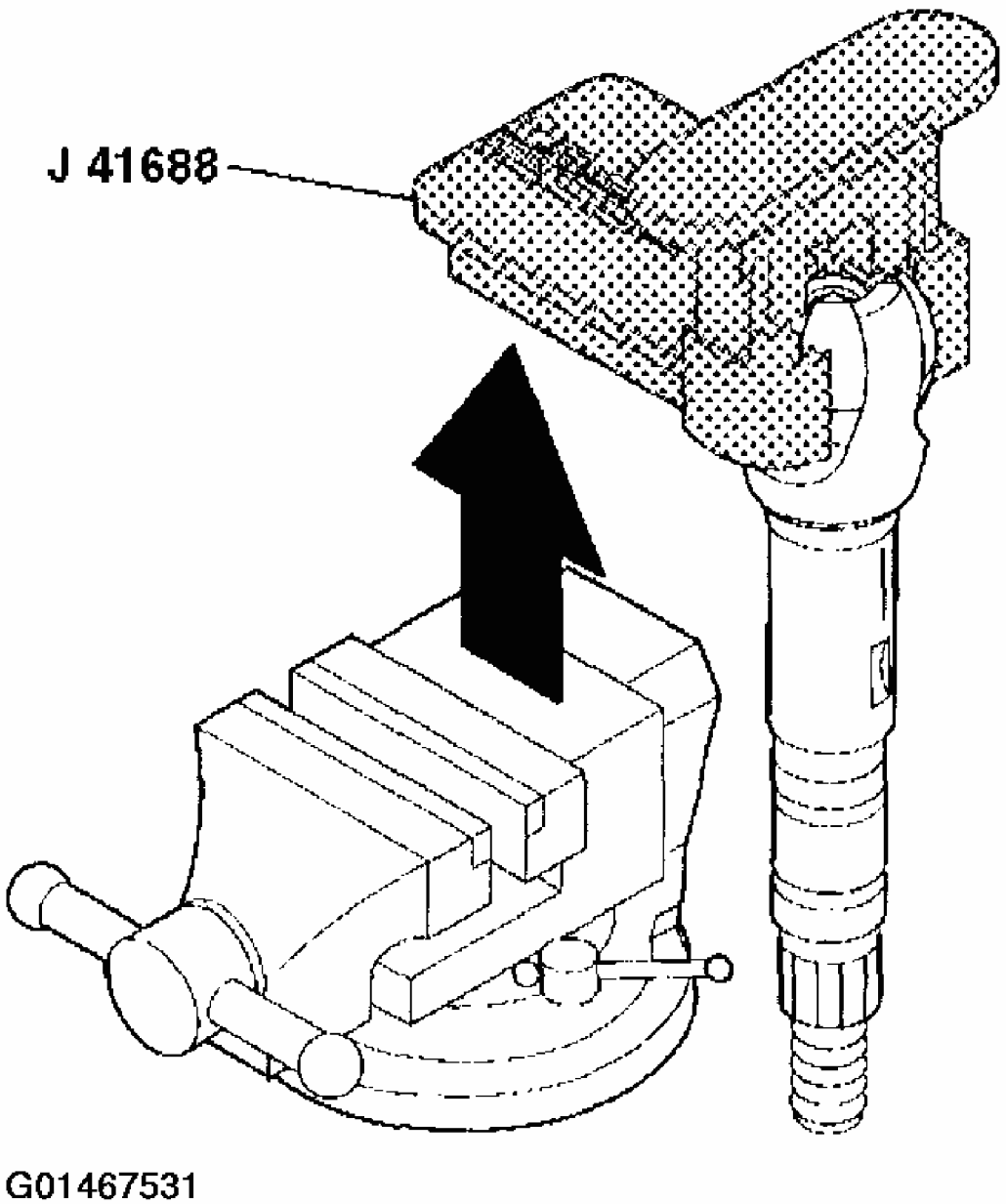

Fig. 145: Removing Race & Upper Shaft Assembly From Vise
Courtesy of GENERAL MOTORS CORP.

12. Lubricate the exposed steering shaft with GM P/N 12345718 (Canadian P/N 10953516).
13. Align the lower steering shaft assembly to the race and upper shaft assembly by using the marks.
14. Tilt the lower steering shaft assembly at 90 degrees to the race and upper shaft

assembly.

15. Install the lower steering shaft assembly onto the race and upper shaft assembly.

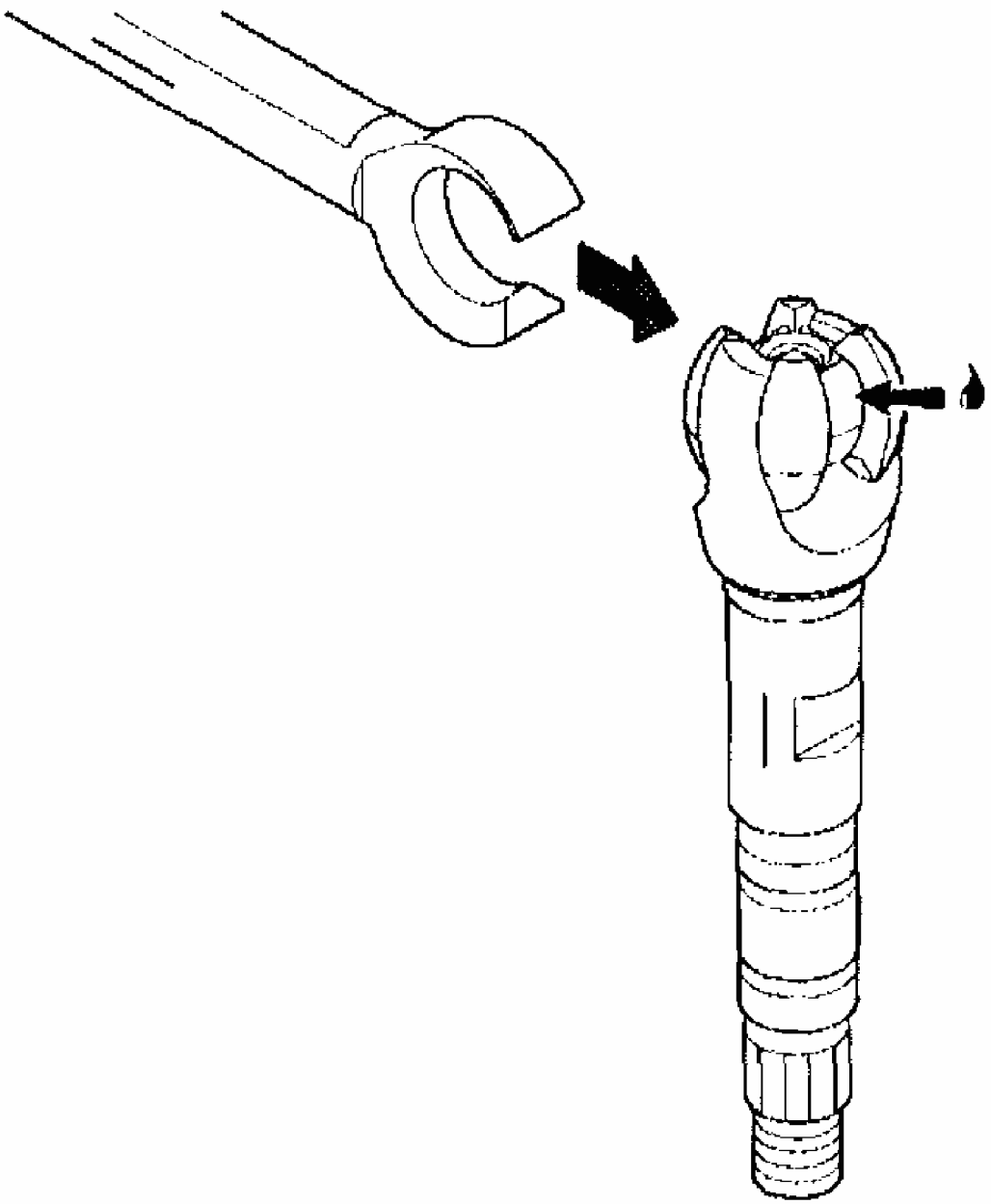

Fig. 146: Installing Lower Steering Shaft Assembly Onto Race & Upper Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

16. Install the steering shaft assembly (2) into the steering column tilt head assembly (1).

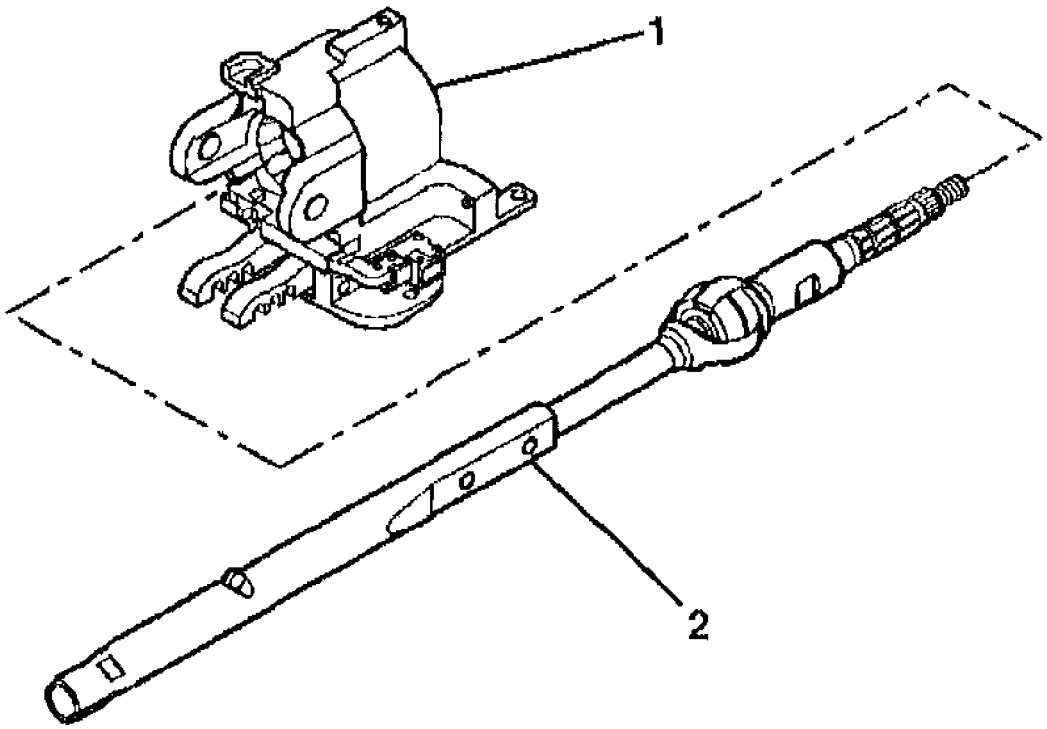

Fig. 147: Installing Steering Shaft Assembly Into Steering Column Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

17. Install the tilt head assembly (1) into the steering column support assembly.
18. Move the tilt lever and push the tilt head assembly up towards the steering column in order to lock the steering wheel lock shoes in place.

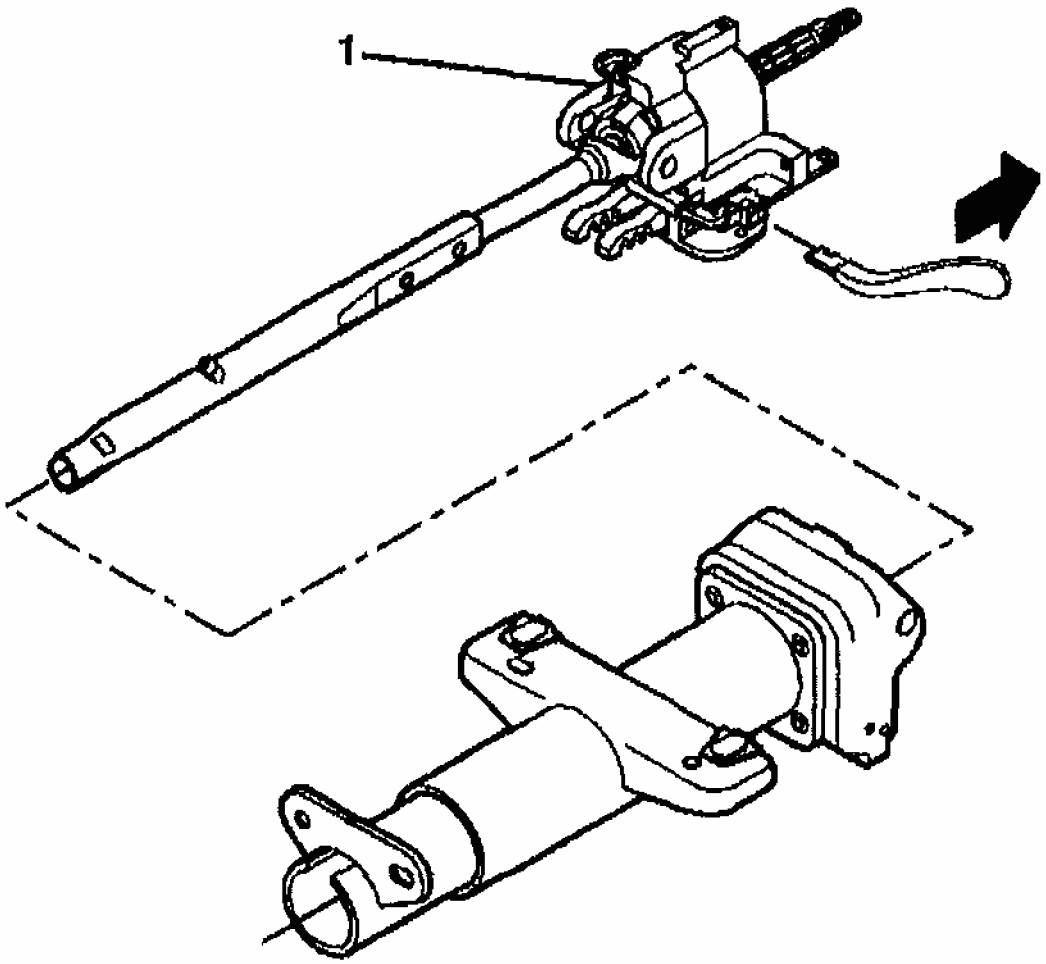

Fig. 148: Installing Tilt Head Assembly Into Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

19. Lubricate the pivot pins (1) with GM P/N 12346293 (Canadian P/N 992723).
20. Firmly seat each pivot pin (1) into the tilt head assembly.
21. Stake the steering column support assembly in the 3 locations around each pivot pin (1).

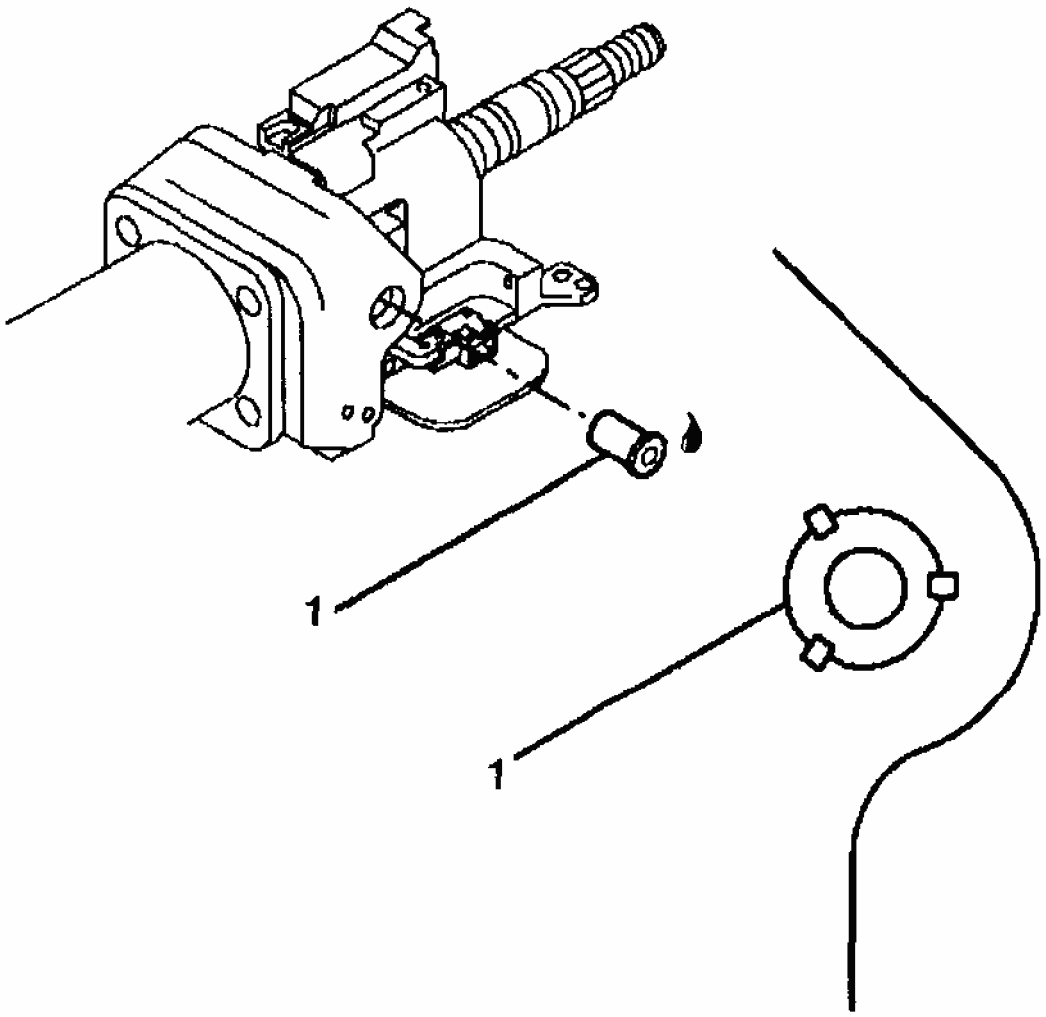

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Fig. 149: Installing Pivot Pin Into Tilt Head Assembly
Courtesy of GENERAL MOTORS CORP.

22. Install the adapter and bearing assembly (1) onto the steering column jacket assembly by performing the following steps:
    22.1. Align the tab on the adapter and bearing assembly (1) with the slot in the steering column jacket assembly.
    22.2. Push the adapter and bearing assembly (1) onto the steering shaft assembly until the tab snaps into the slot.
23. Install the shaft seal retainer (2) onto the adapter and bearing assembly (1):
    23.1. Align the slots of the shaft seal retainer (2) to the ribs of the adapter and bearing assembly (1).

23.2. Push the shaft seal retainer (2) onto the steering shaft assembly so that the shaft seal retainer (2) contacts the adapter and bearing assembly (1).

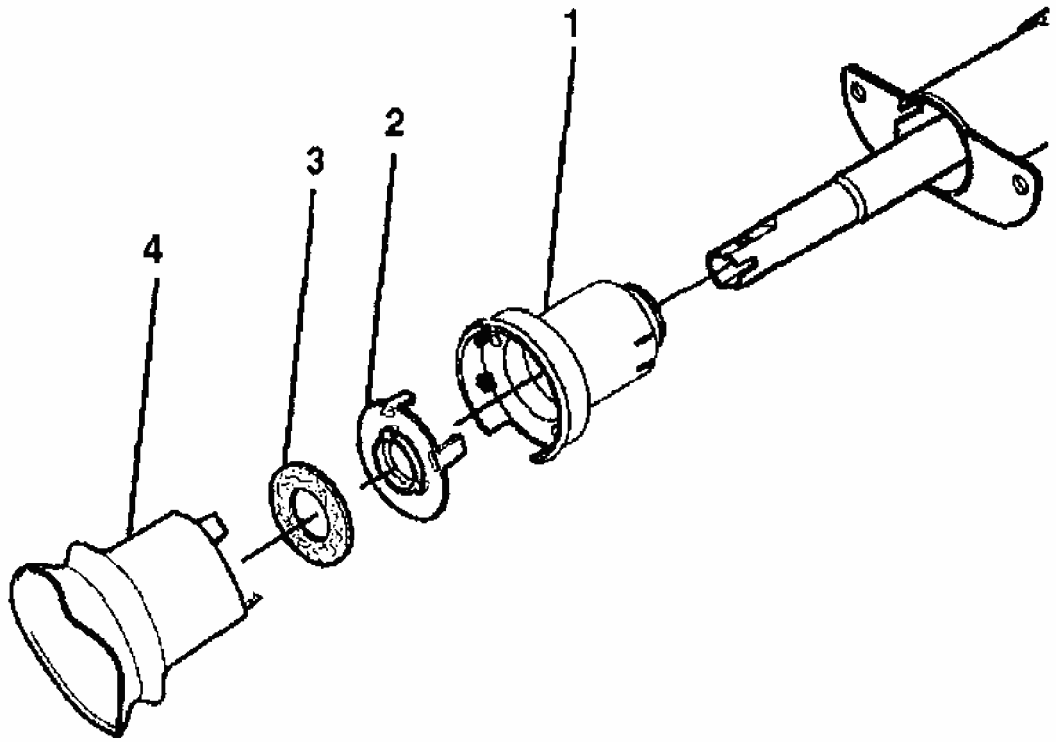


Fig. 150: Installing Adapter & Bearing Assembly Onto Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

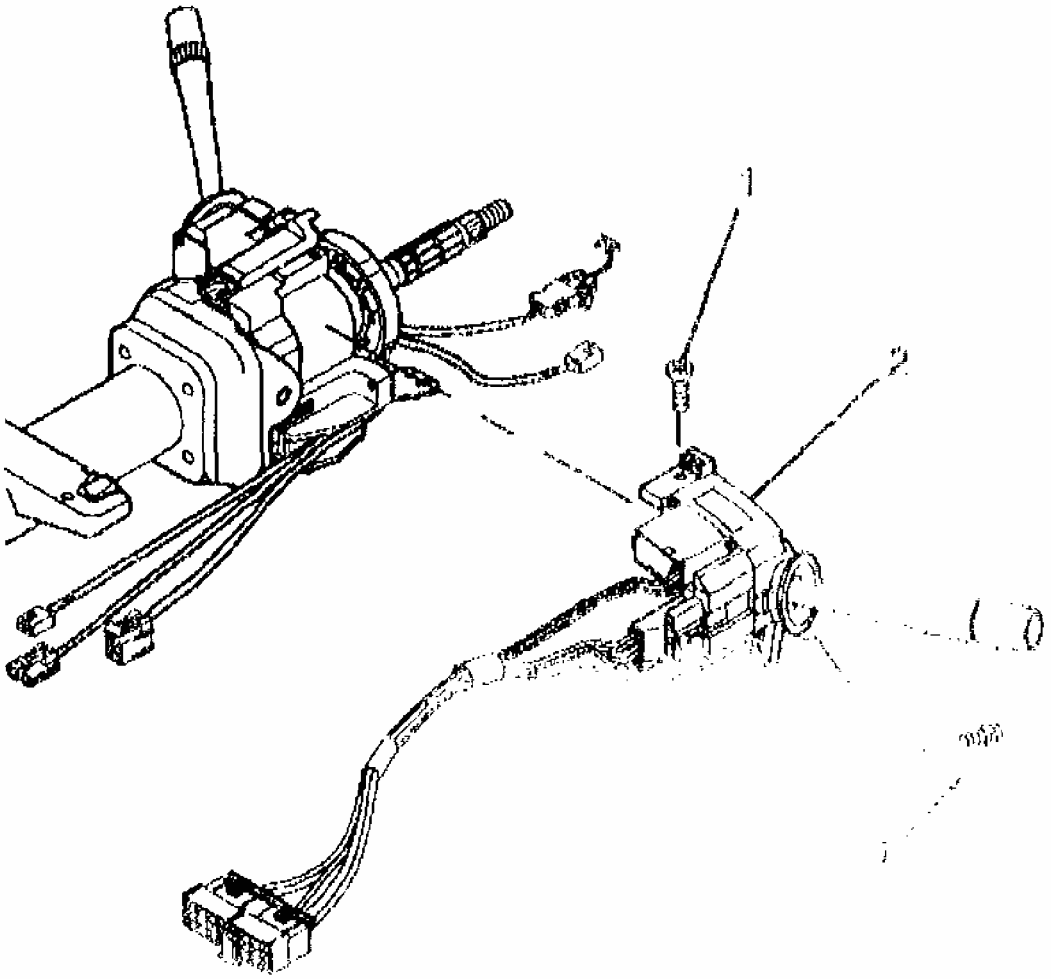
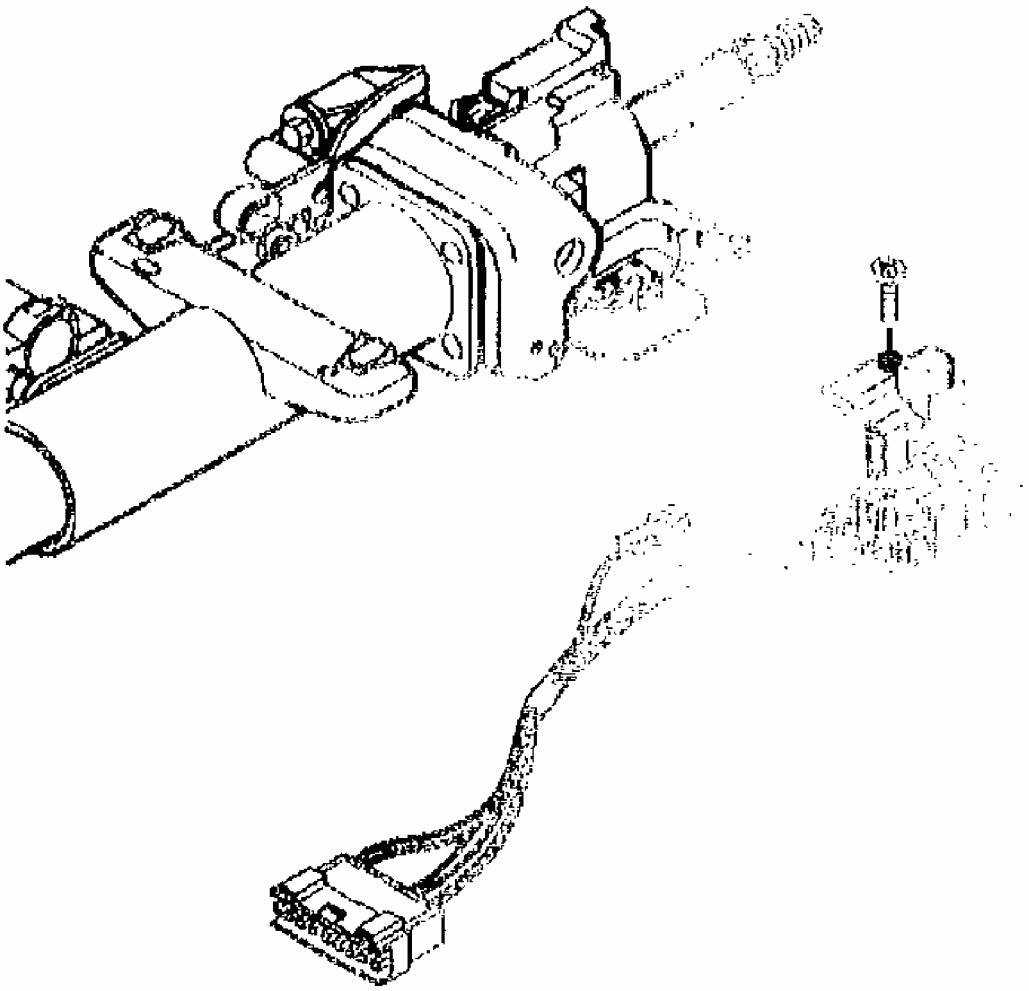


Fig. 151: Turn Signal & Malfunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.



G01467538

Fig. 152: Turn Signal & Malfunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not use excessive force when removing the automatic transmission shift lock control from the steering column. Using excessive force may cause damage to the automatic transmission shift lock control and/or the steering column.

24. Remove the A/T shift lock control in the following way:
    7.1. Put the shift lever clevis into the NEUTRAL position.
    7.2. Use a small screwdriver to pry the A/T shift lock control away from the steering column jacket assembly and the cable shift cam assembly.

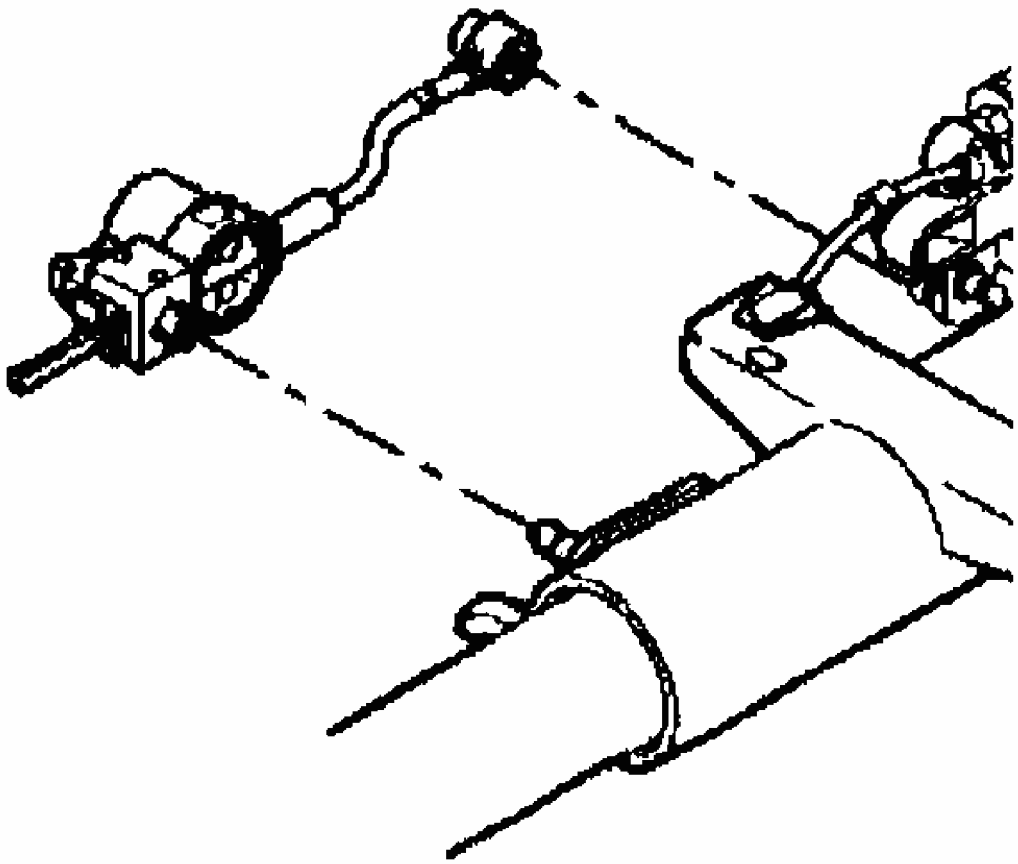


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Fig. 153: A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

25. Remove the 3 flat head tapping screws from the linear shift assembly.

    Remove the linear shift assembly from the steering column support assembly.

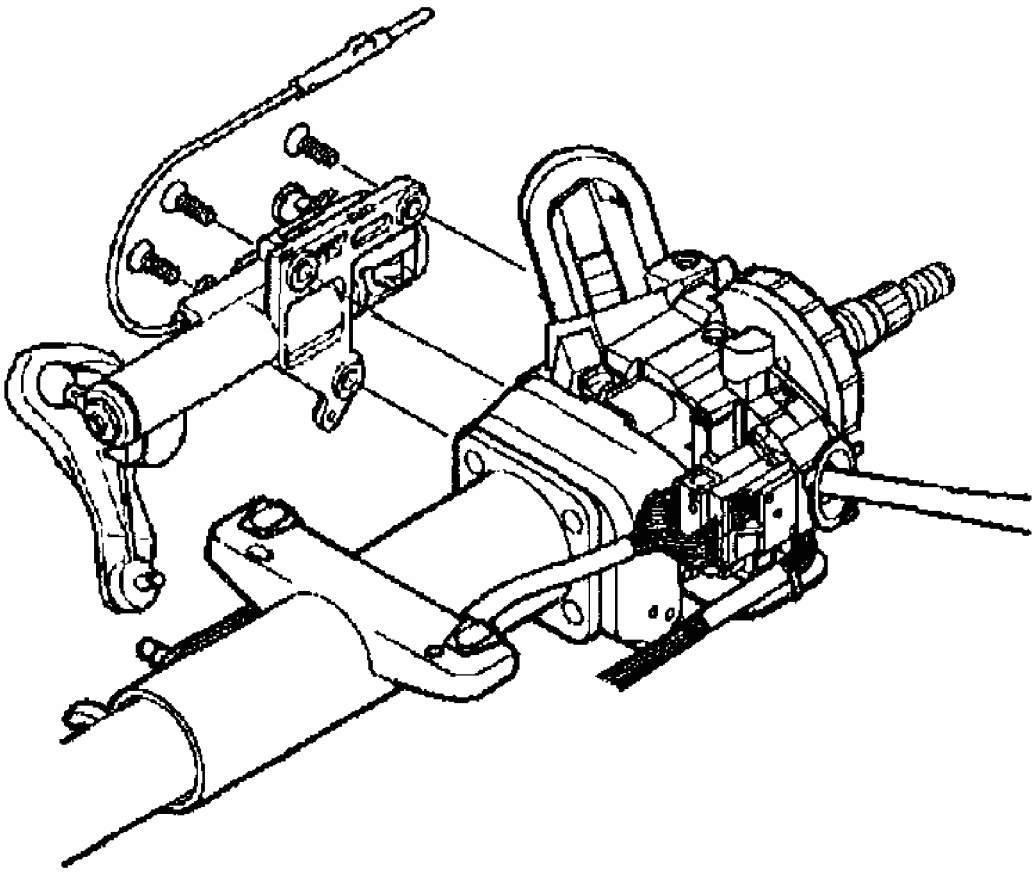

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Fig. 154: Removing Linear Shift Assembly From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

26. Remove the inner boot seal (4).
27. Remove the steering shaft seal (3) from the adapter and bearing assembly (1).
28. Remove the shaft seal retainer (2) from the adapter and bearing assembly (1).
29. Remove the adapter and bearing assembly (1) from the steering shaft assembly.

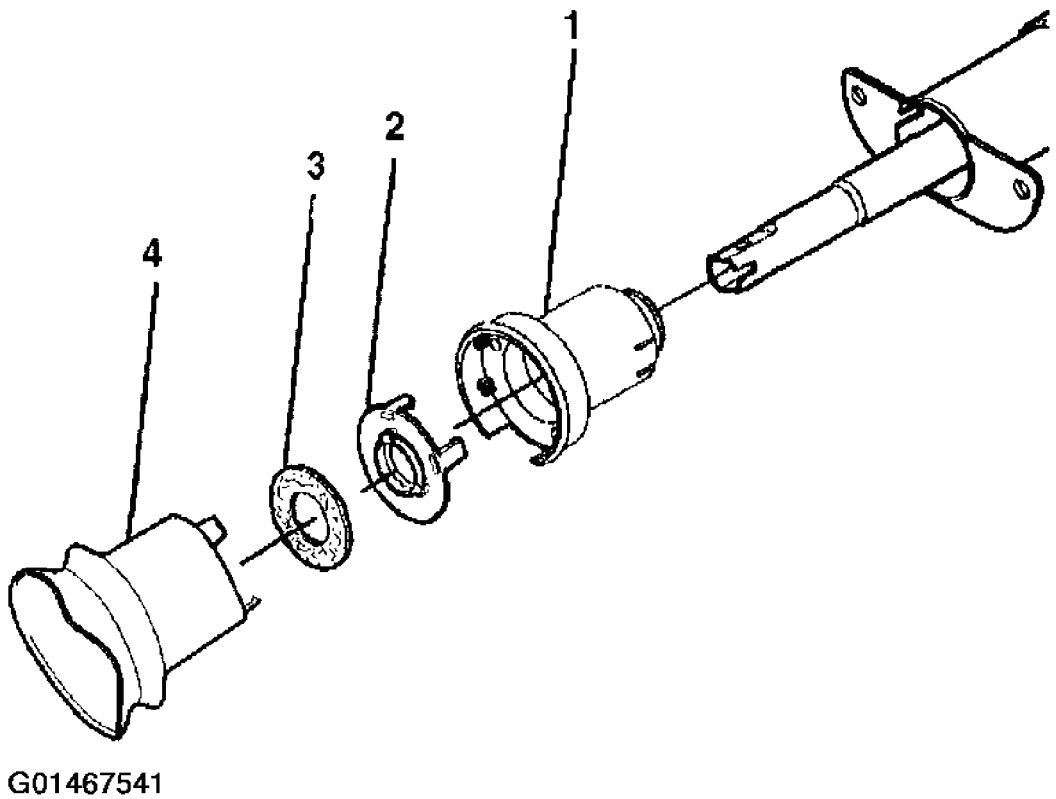

Fig. 155: Removing Adapter & Bearing Assembly From Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

30. Remove the steering shaft assembly (1) from the steering column support assembly (2) and the steering column jacket assembly (3).

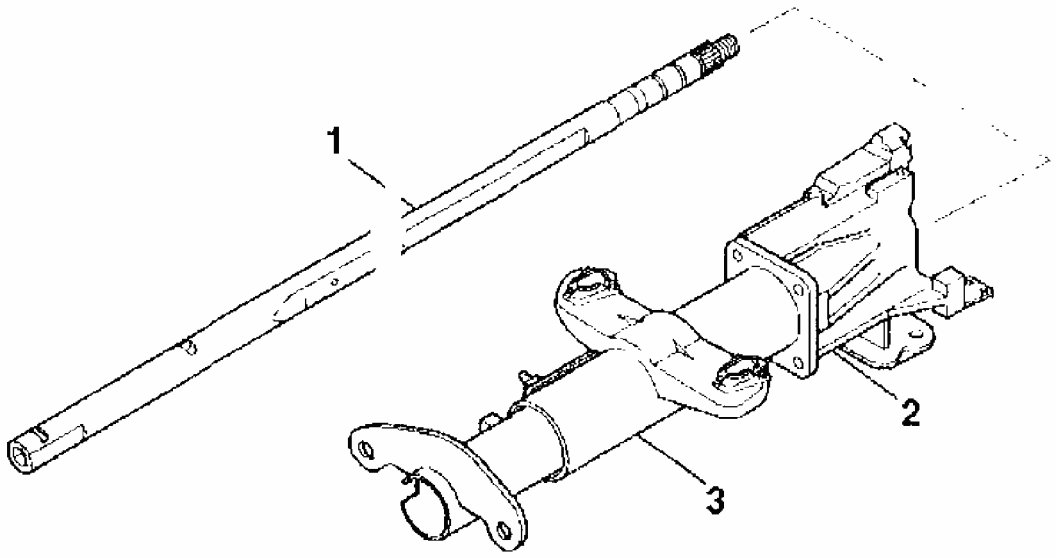

Fig. 156: Removing Steering Shaft Assembly From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

31. Remove the 4 TORX(R) head screws (1) from the support assembly (2).
32. Discard the 4 TORX(R) head screws (1).
33. Remove the support assembly (2) from the jacket assembly (3).

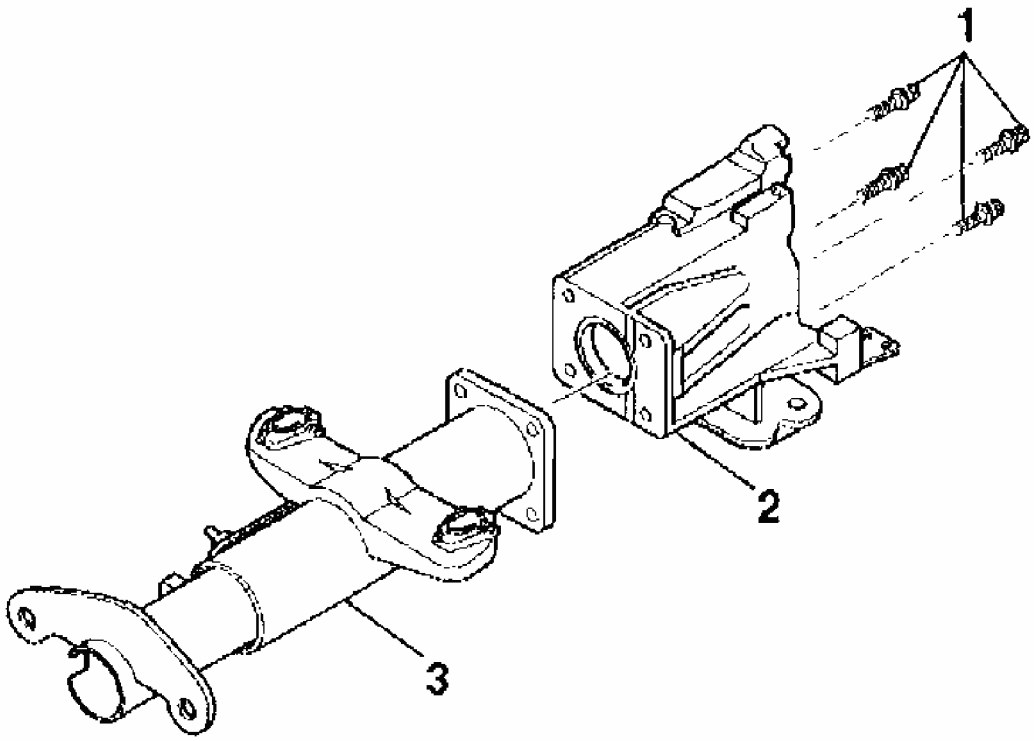

Fig. 157: Removing Support Assembly From Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

1. Attach the steering column support assembly (2) to the steering column jacket assembly (3) with the 4 TORX(R) head screws (1).

   Tighten

   Tighten the screws to 17 N.m (13 lb ft).

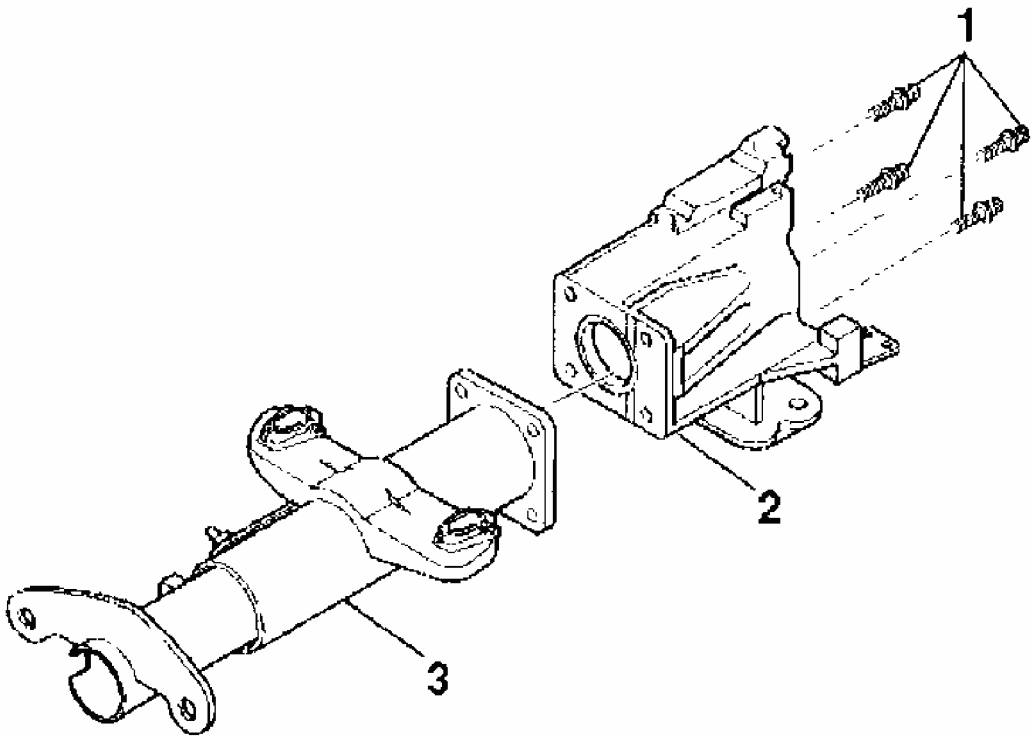

Fig. 158: Installing Steering Column Support Assembly To Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the steering shaft assembly (1) into the steering column support assembly (2).

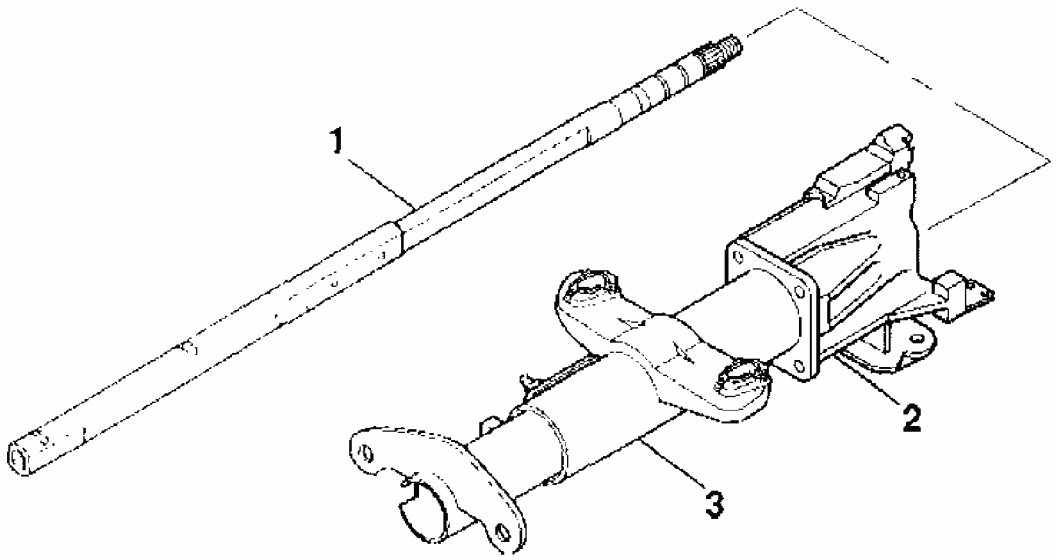

Fig. 159: Installing Steering Shaft Assembly Into Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the adapter and bearing assembly (1) onto the jacket assembly by performing the following procedure:
   3.1. Align the tab on the adapter and bearing assembly (1) with the slot in the jacket assembly.
   3.2. Push the adapter and bearing assembly (1) onto the steering shaft assembly until the tab snaps into the slot.
4. Install the shaft seal retainer (2) onto the adapter and bearing assembly (1):
   4.1. Align the slots of the shaft seal retainer (2) to the ribs of the adapter and bearing assembly (1).
   4.2. Push the shaft seal retainer (2) onto the steering shaft assembly.

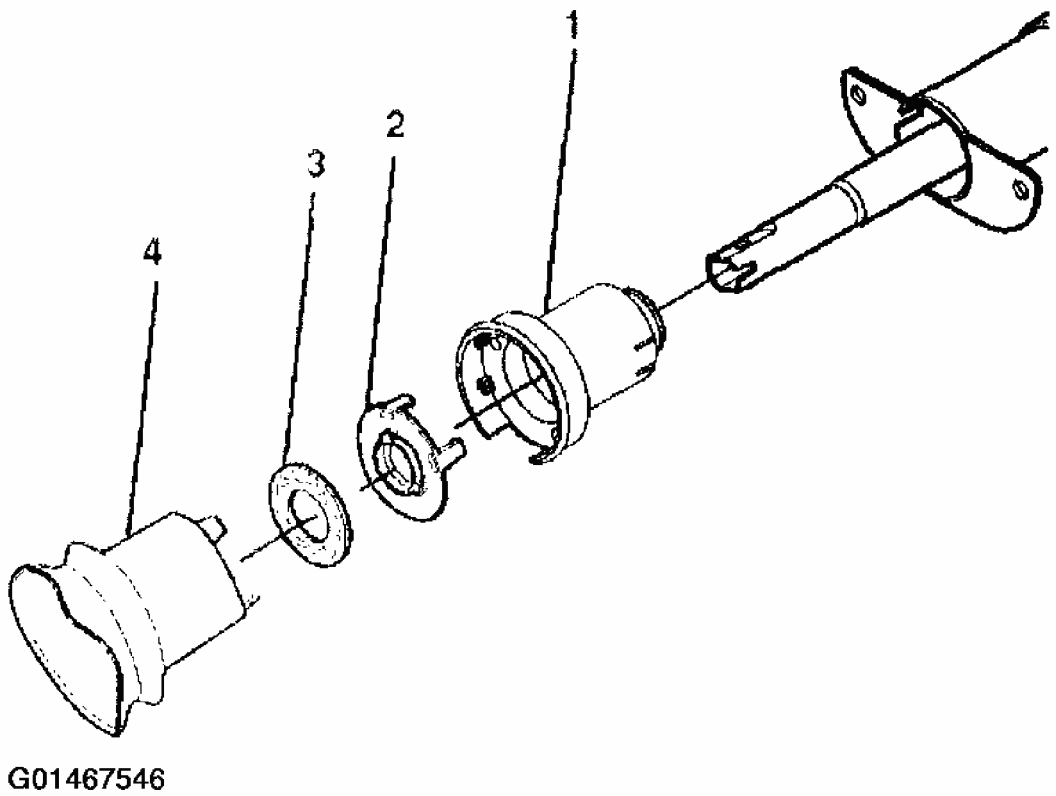

Fig. 160: Installing Adapter & Bearing Assembly Onto Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

5. Install the steering shaft seal (3) onto the steering shaft assembly.
6. Install the inner boot seal (4) onto the steering shaft assembly.
7. Install the linear shift assembly onto the steering column support assembly.
8. Secure the linear shift assembly to the steering column support assembly with the 3 flat head tapping screws.

   Move the linear shift assembly out of the PARK position to install the lower socket tapping screw.

   Tighten

   Tighten the tapping screws to 10 N.m (89 lb in).

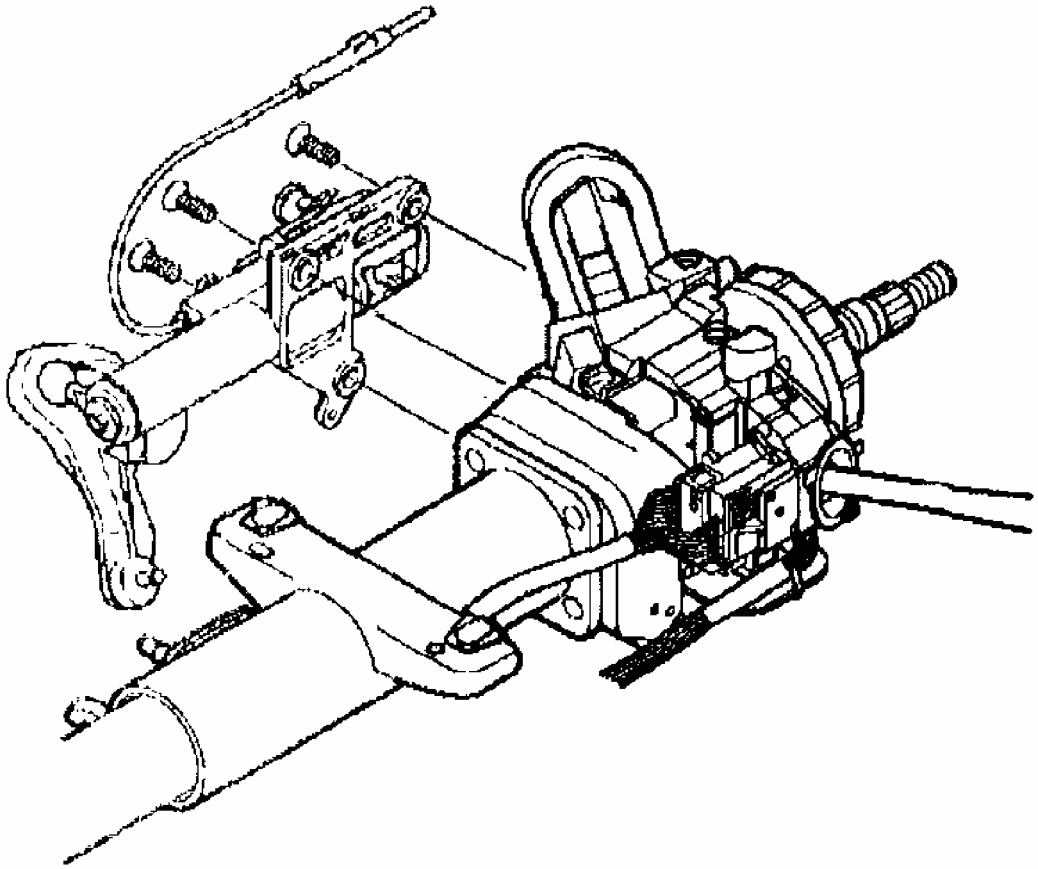

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Fig. 161: Installing Linear Shift Assembly Onto Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

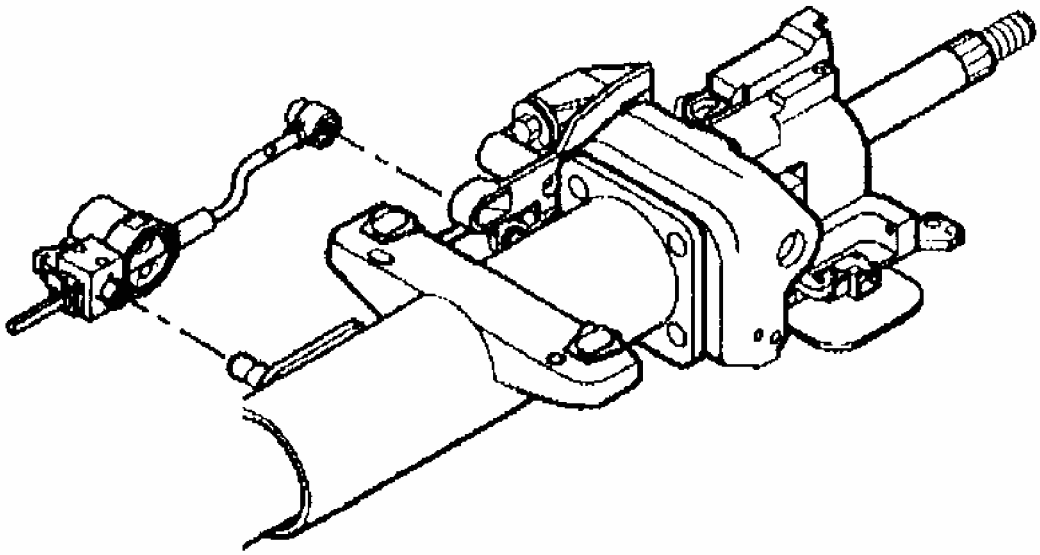

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Fig. 162: A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

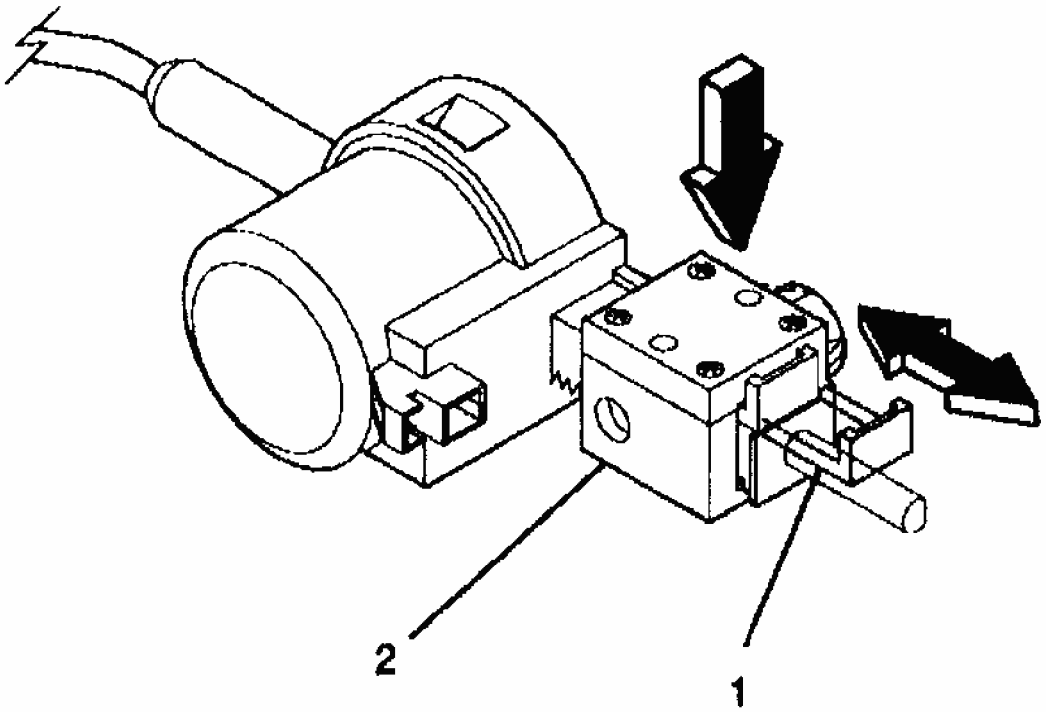


Fig. 163: Adjusting A/T Shift Lock Control
Courtesy of GENERAL MOTORS CORP.

9. Adjust the A/T shift lock control by performing the following procedure:
   11.1. Pull out the tab (1) on the adjuster block side (2) of the A/T shift lock control.
   11.2. Press on the adjuster block (2) to compress the internal adjuster spring which disengages the adjuster teeth.
   11.3. Slide the adjuster block (2) as far away from the solenoid as possible.
   11.4. Push inward on the tab (1) in order to lock the adjuster block in place.
10. Inspect the A/T shift lock control for the following conditions:
    12.1. The A/T shift lock control must lock the shift lever clevis when the shift lever clevis is put into the PARK position.

    Once the steering column is installed in the vehicle, the gear shift lever must remain in the PARK position unless the brake pedal is depressed.

    12.2. The solenoid will be energized.
11. Readjust the A/T shift lock control if needed.

CAUTION: Refer to SIR INFLATOR MODULE COIL CAUTION in Cautions and Notices.

Important: Rest the electrical contact of the turn signal and multifunction switch assembly on the turn signal cancel cam assembly.

12. Install the turn signal and multifunction switch assembly onto the steering column housing assembly.
13. Screw the 2 pan head tapping screws into the turn signal and multifunction switch assembly.

Tighten

Tighten the screws to 7 N.m (62 lb in).

14. Install the ignition lock cylinder case. Refer to **IGNITION LOCK CYLINDER CASE REPLACEMENT (FLOOR SHIFT)** or **IGNITION LOCK CYLINDER CASE REPLACEMENT (COLUMN SHIFT)** .
15. Install the ignition lock cylinder. Refer to **IGNITION LOCK CYLINDER REPLACEMENT** .
16. Install the shift lever assembly. Refer to **SHIFT LEVER REPLACEMENT** .
17. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

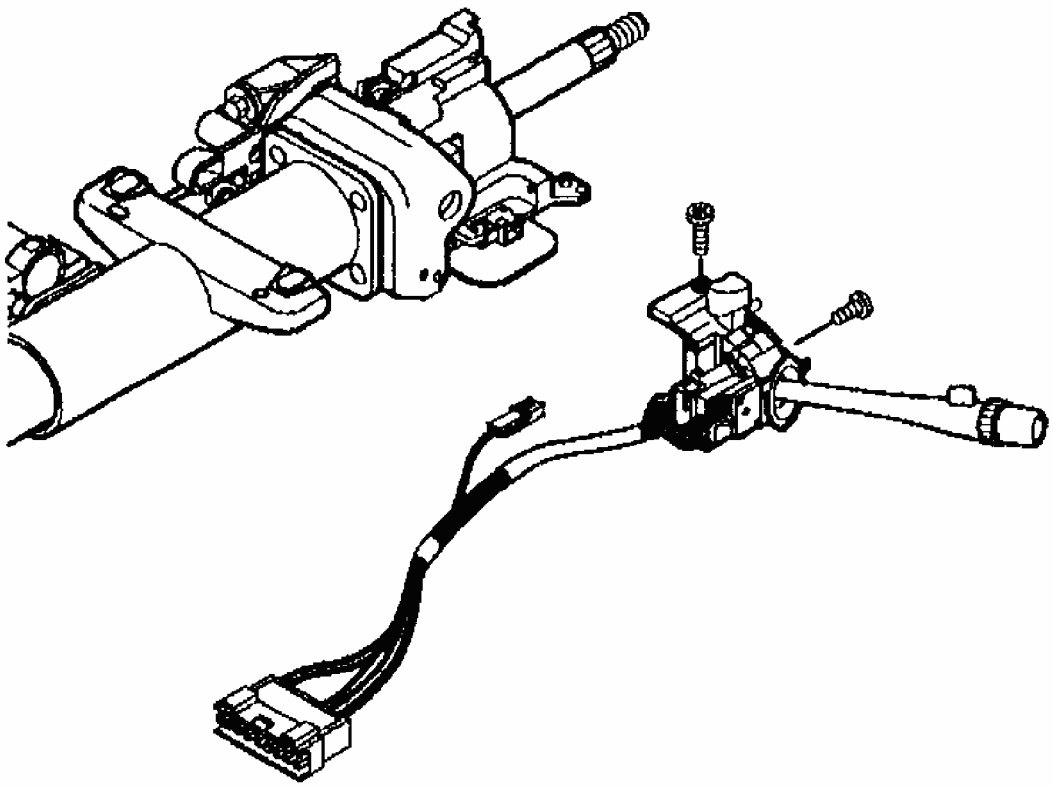


Fig. 164: Installing Turn Signal & Multifunction Switch Assembly Onto Steering Column Housing Assembly
Courtesy of GENERAL MOTORS CORP.

LOWER BEARING AND STEERING COLUMN JACKET REPLACEMENT (FLOOR SHIFT STANDARD)

Removal Procedure

CAUTION: Refer to SIR CAUTION in Cautions and Notices.

1. Disable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.
2. Remove the ignition lock cylinder. Refer to **IGNITION LOCK CYLINDER REPLACEMENT** .
3. Remove the ignition lock cylinder case. Refer to **IGNITION LOCK CYLINDER CASE REPLACEMENT (FLOOR SHIFT)** or **IGNITION LOCK CYLINDER CASE REPLACEMENT (COLUMN SHIFT)** .

4. Inspect the steering column assembly for accident damage. Refer to **STEERING COLUMN ACCIDENT DAMAGE INSPECTION** .
5. Remove the 2 pan head screws (1) from the turn signal and multifunction switch assembly (2).
6. Remove the turn signal and multifunction switch assembly (2).

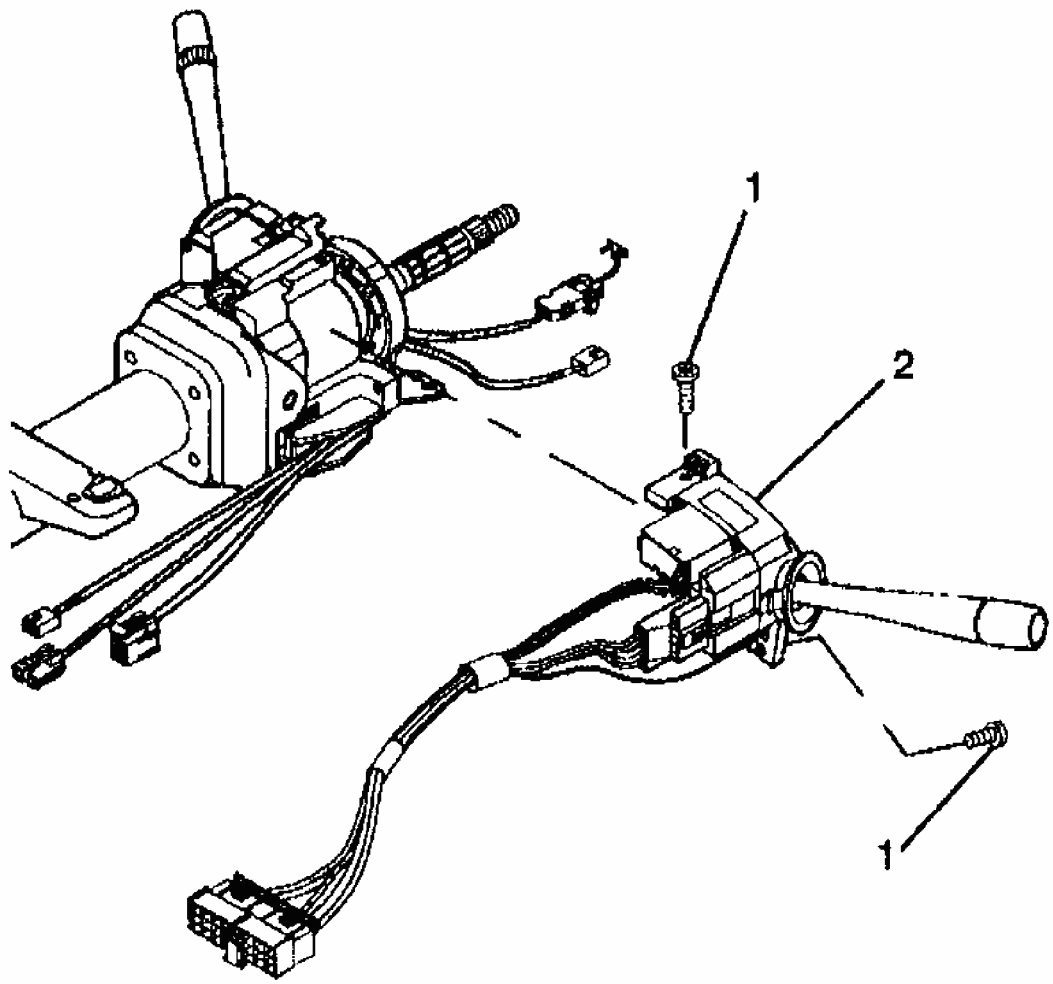


Fig. 165: Turn Signal & Multifunction Switch Assembly
Courtesy of GENERAL MOTORS CORP.

7. Remove the inner boot seal (4).
8. Remove the steering shaft seal (3) from the adapter and bearing assembly (1).
9. Remove the shaft seal retainer (2) from the adapter and bearing assembly (1).
10. Remove the adapter and bearing assembly (1) from the steering shaft assembly.

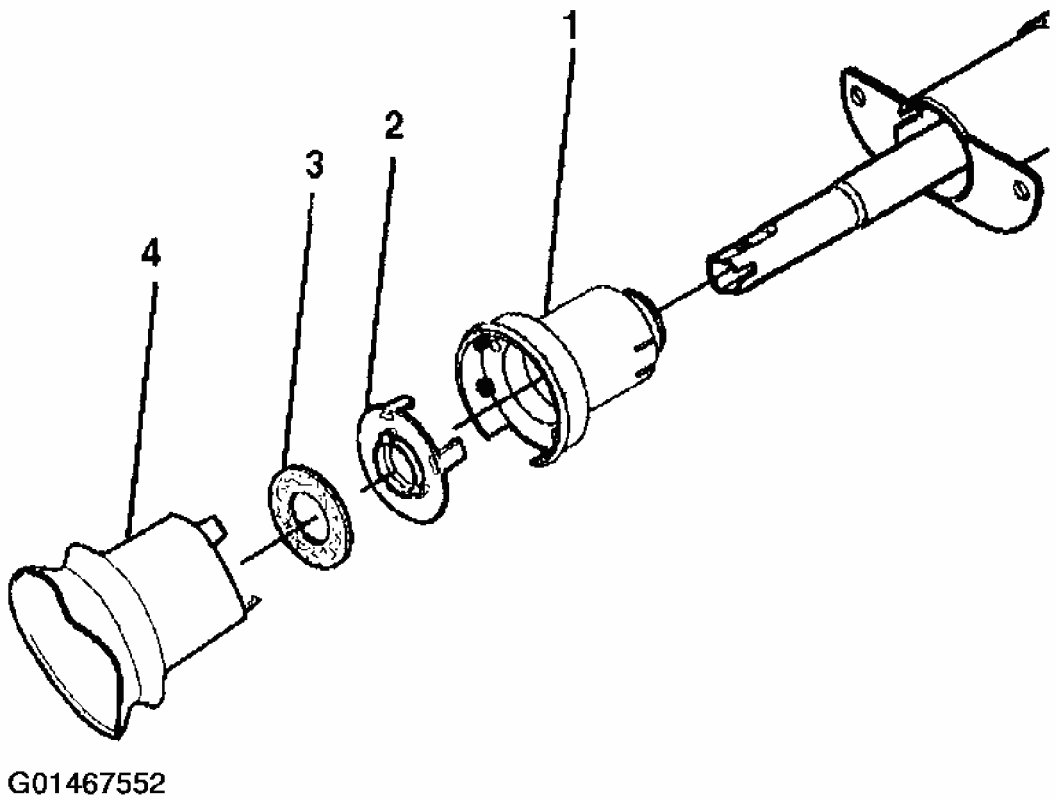


Fig. 166: Removing Adapter & Bearing Assembly From Steering Shaft Assembly
Courtesy of GENERAL MOTORS CORP.

11. Remove the steering shaft assembly (1) from the steering column support assembly (2) and the steering column jacket assembly (3).

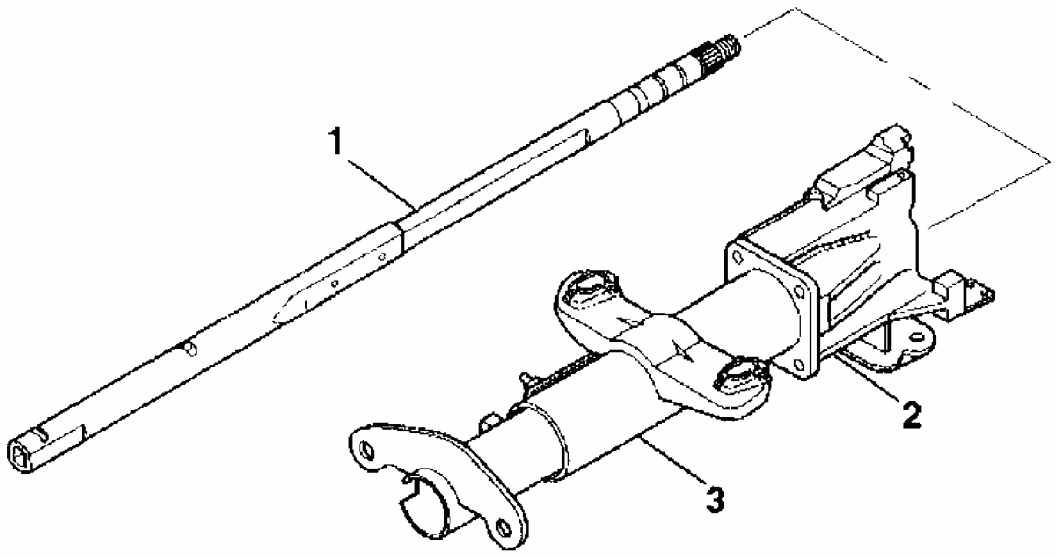


Fig. 167: Removing Steering Shaft Assembly From Steering Column Support Assembly
Courtesy of GENERAL MOTORS CORP.

12. Remove the 4 TORX(R) head screws (1) from the support assembly (2).
13. Discard the 4 TORX(R) head screws (1).
14. Remove the support assembly (2) from the jacket assembly (3).

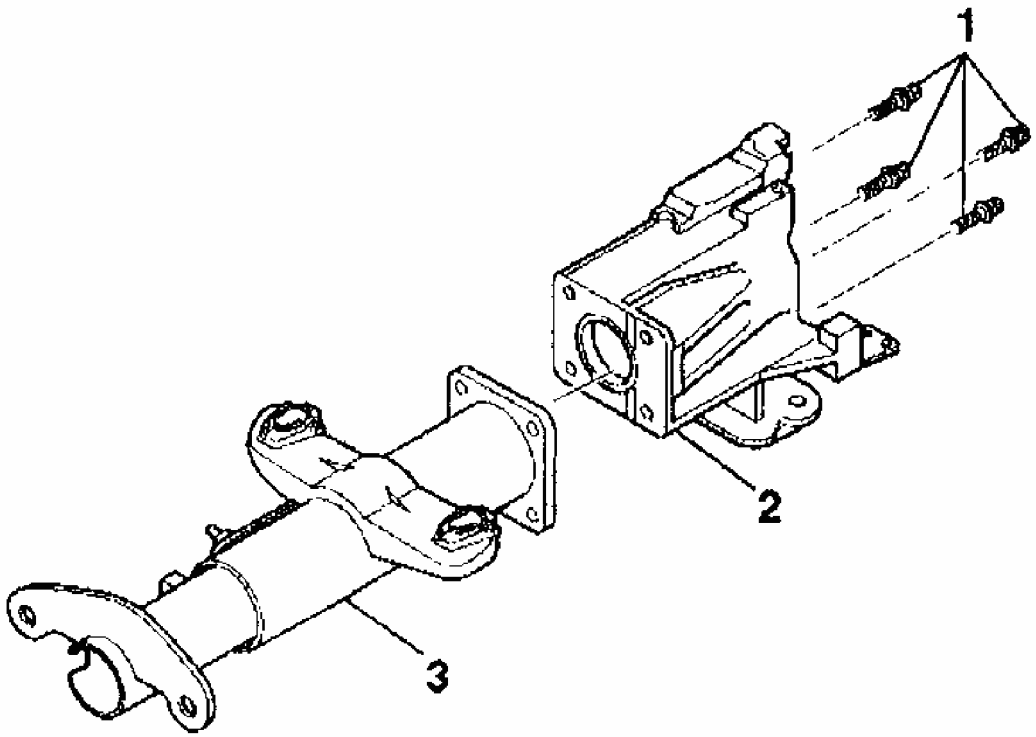


Fig. 168: Removing Support Assembly From Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

1. Attach the steering column support assembly (2) to the steering column jacket assembly (3) with 4 NEW TORX(R) head screws (1).

   Tighten

   Tighten the screws to 17 N.m (13 lb ft).

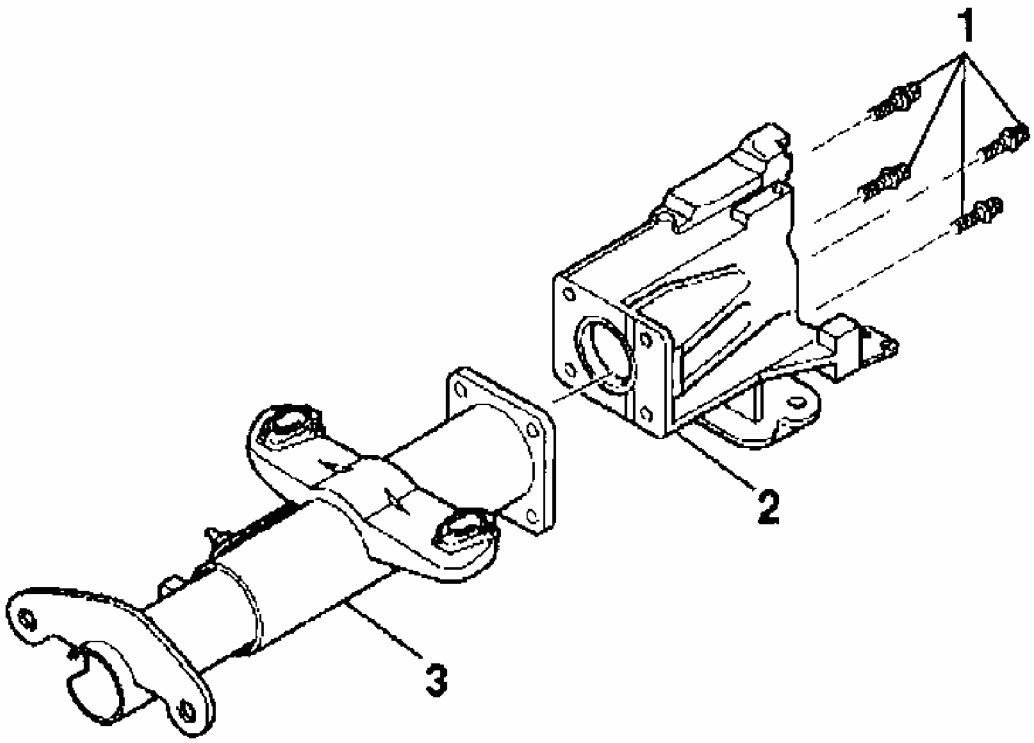


Fig. 169: Installing Steering Column Support Assembly To Steering Column Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

2. Install the steering shaft assembly (1) into the support assembly (2) and the jacket assembly (3).

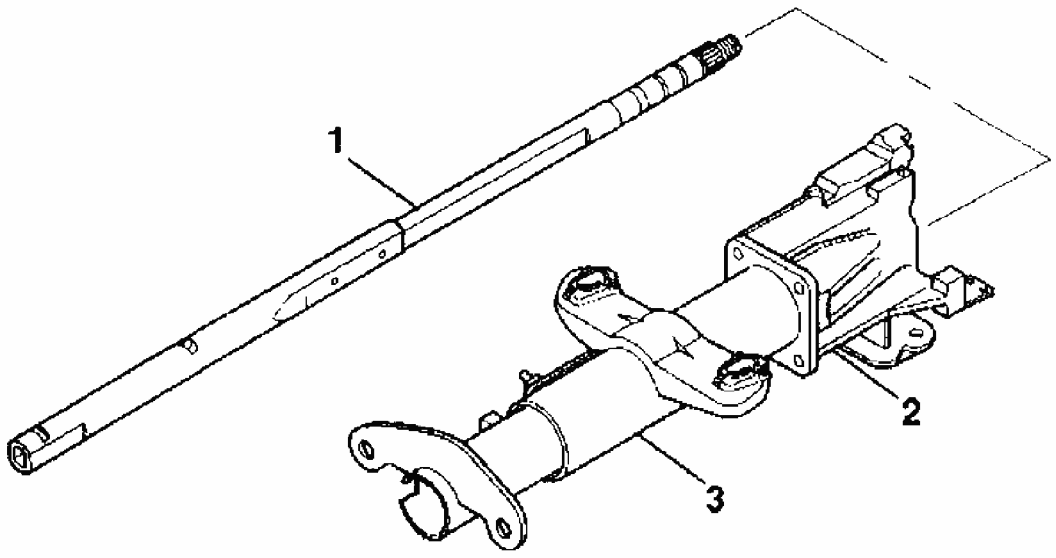


Fig. 170: Installing Steering Shaft Assembly Into Support Assembly & Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

3. Install the adapter and bearing assembly (1) onto the jacket assembly by performing the following procedure:
    3.1. Align the tab on the adapter and bearing assembly (1) with the slot in the steering column jacket assembly.
    3.2. Push the adapter and bearing assembly (1) onto the steering shaft assembly until the tab snaps into the slot.
4. Install the shaft seal retainer (2) onto the adapter and bearing assembly (1):
    4.1. Align the slots of the shaft seal retainer (2) to the ribs of the adapter and bearing assembly (1).
    4.2. Push the shaft seal retainer (2) onto the steering shaft assembly.
5. Install the steering shaft seal (3) onto the steering shaft assembly.
6. Install the inner boot seal (4) onto the steering shaft assembly.

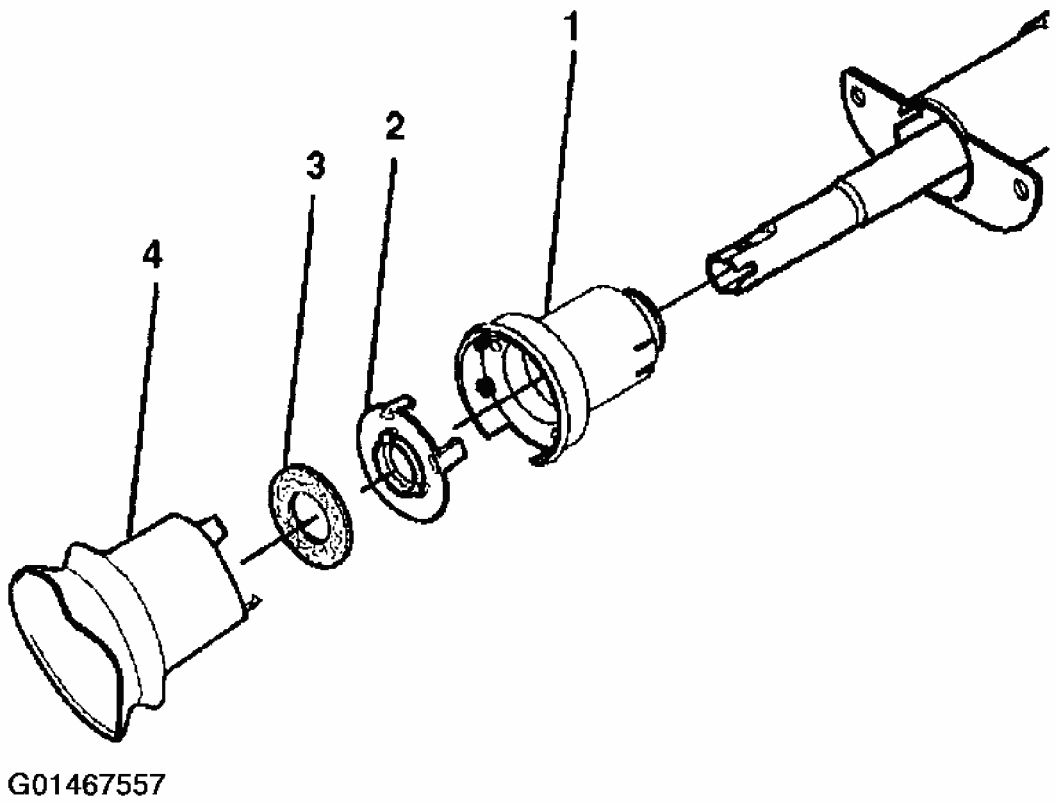


Fig. 171: Installing Adapter & Bearing Assembly Onto Jacket Assembly
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to SIR INFLATOR MODULE COIL CAUTION in Cautions and Notices.

Important: The electrical contact of the turn signal and multifunction switch assembly must rest on the turn signal cancel cam assembly.

7. Install the turn signal and multifunction switch assembly (2) onto the steering column housing assembly.
8. Screw the 2 pan head tapping screws (1) into the turn signal and multifunction switch assembly (2).

Tighten

Tighten the screws to 7 N.m (62 lb in).

9. Install the ignition lock cylinder case. Refer to **IGNITION LOCK CYLINDER CASE REPLACEMENT (FLOOR SHIFT)** or **IGNITION LOCK CYLINDER CASE REPLACEMENT (COLUMN SHIFT)** .

10. Install the ignition lock cylinder. Refer to **IGNITION LOCK CYLINDER REPLACEMENT** .
11. Enable the SIR system. Refer to **DISABLING & ACTIVATING AIR BAG SYSTEM** in SIR.

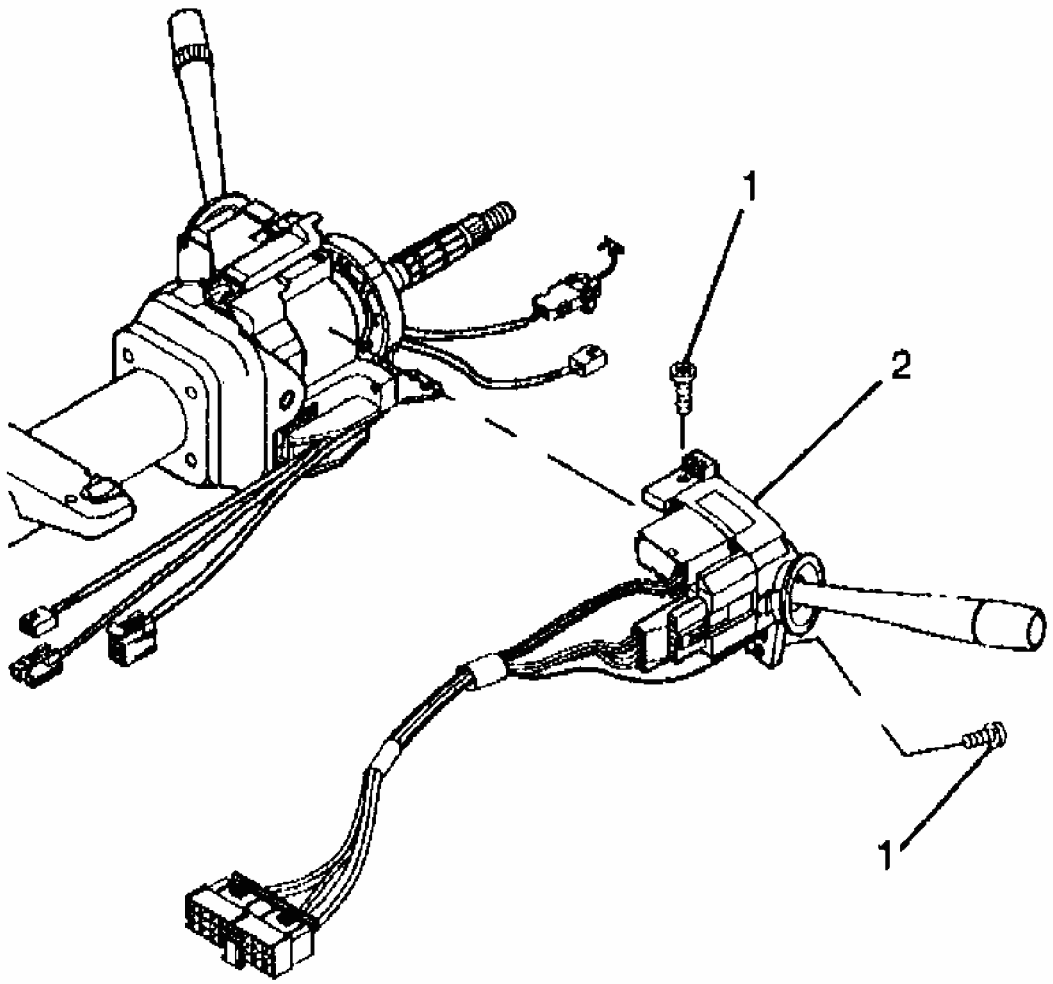


Fig. 172: Installing Turn Signal & Multifunction Switch Assembly Onto Steering Column Housing Assembly
Courtesy of GENERAL MOTORS CORP.

INFLATABLE RESTRAINT STEERING WHEEL MODULE COIL CENTERING

NOTE: The new SIR coil assembly will be centered. Improper alignment of the SIR coil assembly may damage the unit, causing an inflatable restraint malfunction.

1. Verify the following conditions before centering the SIR coil:
   - The wheels on the vehicle are straight ahead.
   - The block tooth (1) of the steering shaft assembly is in the 12 o'clock position.
   - The ignition switch is in the LOCK position.

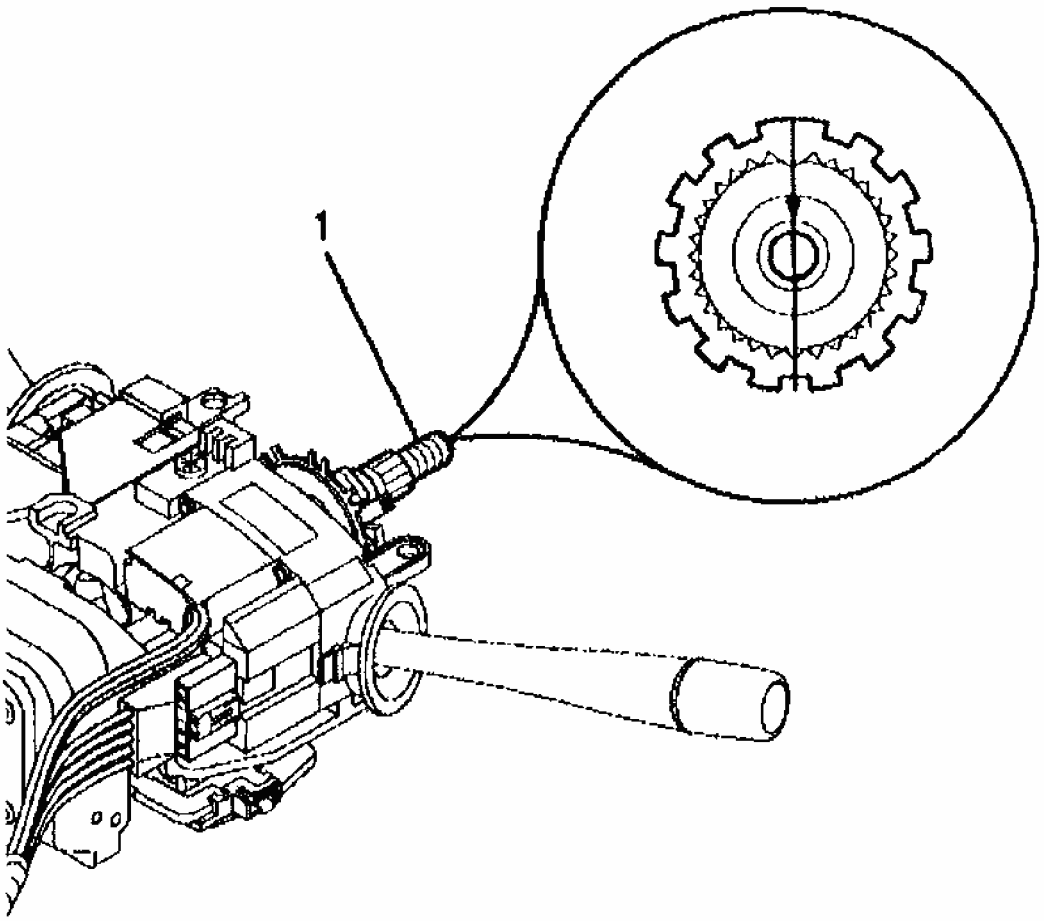


Fig. 173: Checking Block Tooth Of Steering Shaft Assembly Is In 12 O'Clock Position Before Centering SIR Coil
Courtesy of GENERAL MOTORS CORP.

2. If the front (5) of the SIR coil has a centering window (4), and the back side (2) includes a spring service lock (1), perform the following steps:
   2.1. Hold the SIR coil with the face up.
   2.2. While depressing the spring service lock, rotate the coil hub clockwise until the coil ribbon stops.

2.3. Rotate the coil hub slowly, counterclockwise, until the centering window appears yellow and both arrows (3) line up.

2.4. Release spring service lock between the locking tab. The SIR coil is now centered.

2.5. Align the centered SIR coil with the horn tower and slide onto the steering shaft assembly.

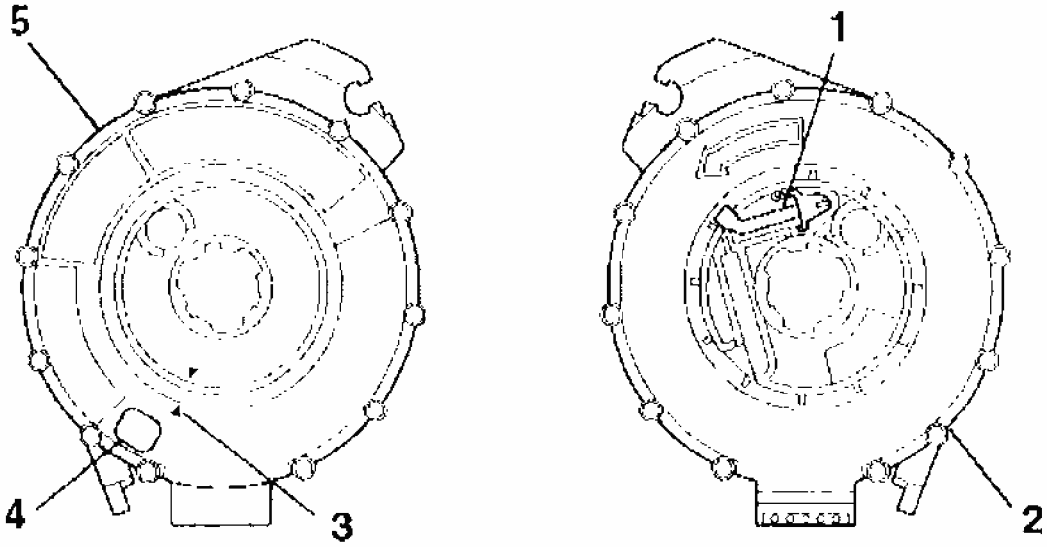


Fig. 174: Centering Window (Front Side) & Spring Service Lock (Back Side) Of SIR Coil (1 Of 4)
Courtesy of GENERAL MOTORS CORP.

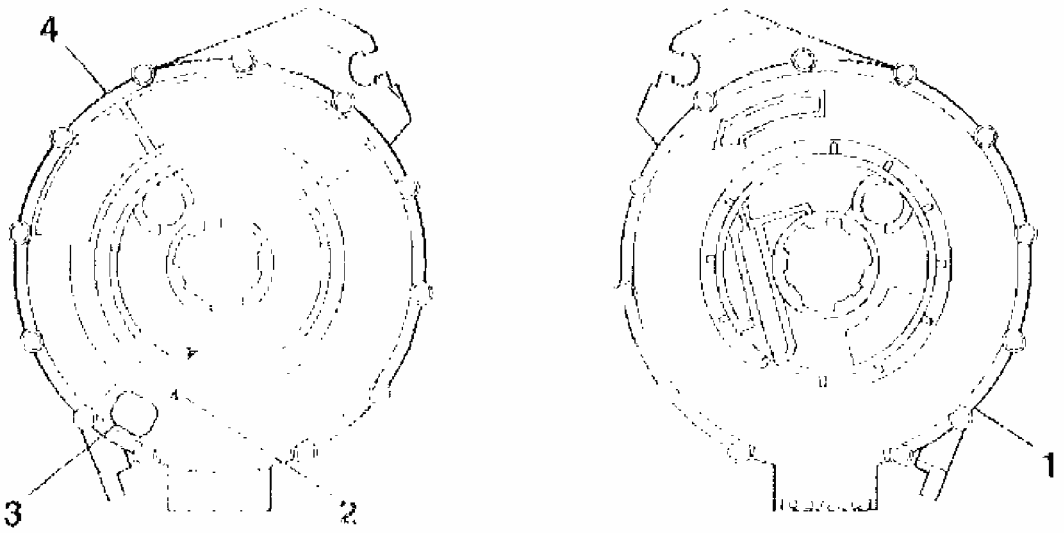


Fig. 175: Centering Window (Front Side) & Spring Service Lock (Back Side) Of SIR Coil (2 Of 4)
Courtesy of GENERAL MOTORS CORP.

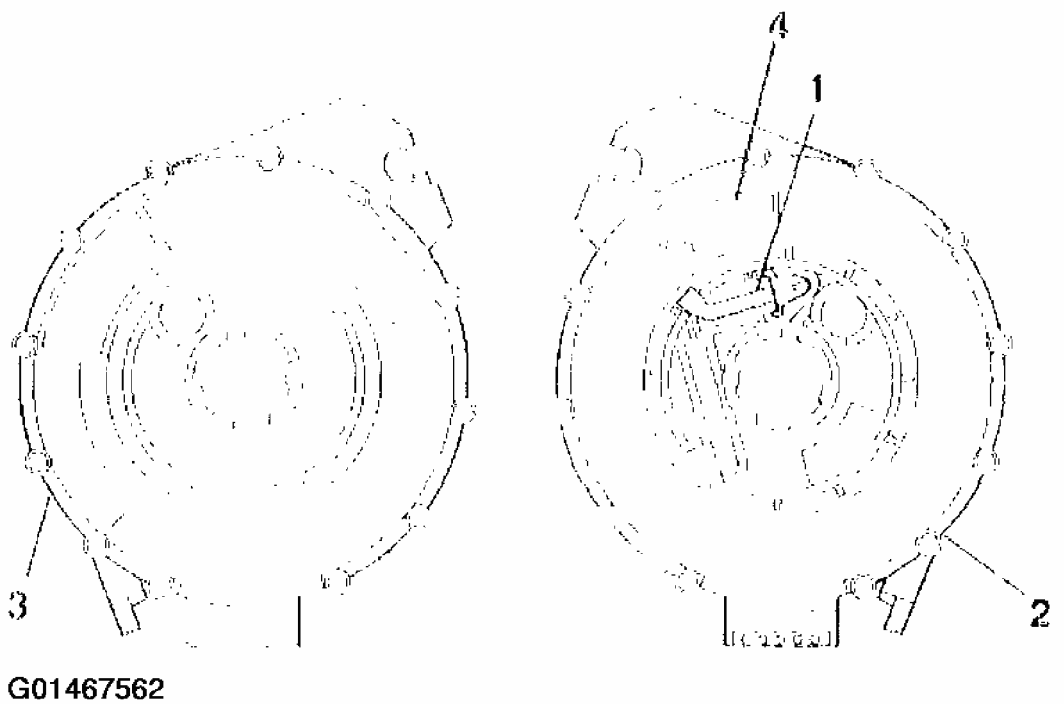


Fig. 176: Centering Window (Front Side) & Spring Service Lock (Back Side) Of

SIR Coil (3 Of 4)
Courtesy of GENERAL MOTORS CORP.

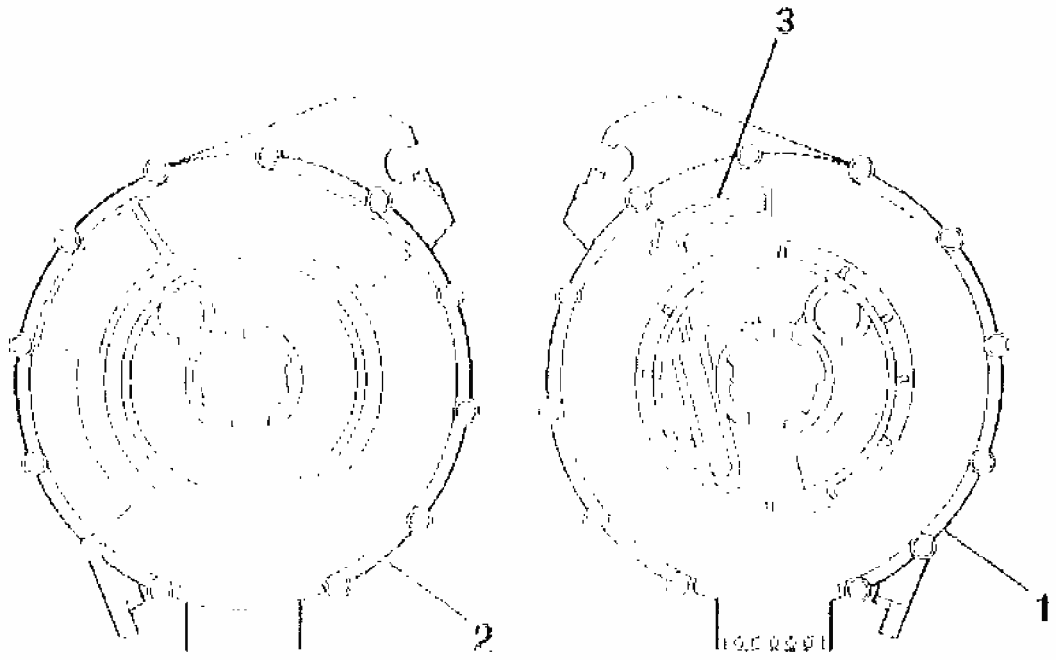


Fig. 177: Centering Window (Front Side) & Spring Service Lock (Back Side) Of SIR Coil (4 Of 4)
Courtesy of GENERAL MOTORS CORP.

DESCRIPTION AND OPERATION

STEERING WHEEL AND COLUMN DESCRIPTION AND OPERATION

The steering wheel and column has 4 primary functions:

- Vehicle steering
- Vehicle security
- Driver convenience
- Driver safety

Vehicle Steering

The steering wheel is the first link between the driver and the vehicle. The steering wheel is fastened to a steering shaft within the column. At the lower end of the column, the intermediate shaft connects the column to the steering gear.

Vehicle Security-Some Vehicle Models

Theft deterrent components are mounted and designed into the steering column. The following components allow the column to be locked in order to minimize theft:

- The ignition switch
- The steering column lock
- The ignition cylinder

Driver Convenience

The steering wheel and column may also have driver controls attached for convenience and comfort.

The following controls may be mounted on or near the steering wheel or column.

- The turn signal switch
- The hazard switch
- The headlamp dimmer switch
- The wiper/washer switch
- The horn pad/cruise control switch
- The redundant radio/entertainment system controls
- The tilt or tilt/telescoping functions
- The navigation/OnStar(R) features
- The HVAC controls

Driver Safety

The energy-absorbing steering column compresses in the event of a front-end collision, which reduces the chance of injury to the driver. The mounting capsules break away from the mounting bracket in the event of an accident.

Ignition Lock Cylinder Control Actuator

If the vehicle is equipped with a floor mounted console gear shifter, it has a ignition lock cylinder control actuator system in the steering column as an added safety feature. The ignition lock cylinder control actuators purpose is to prevent the steering wheel from being locked when the transmission is in gear and the vehicle may still be moving. The column ignition lock system consists of a ignition lock cylinder control actuator, and a park position switch that is located in the A/T shift lock control switch. The ignition lock cylinder control actuator contains a pin that is spring loaded out to mechanically prevent the ignition key cylinder from being turned to the lock position when vehicle transmission is not in the Park position. If vehicle power is lost, and/or the transmission is not in the Park position the

operator will not be able to turn the ignition key to the lock position and will not be able to remove the ignition key from the column.

SPECIAL TOOLS & EQUIPMENT

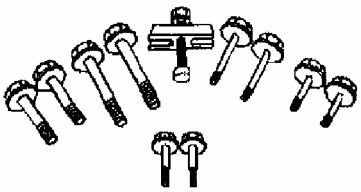
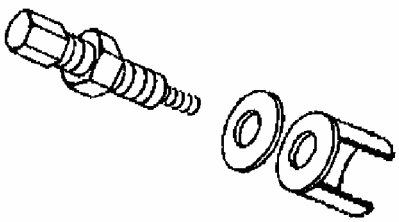
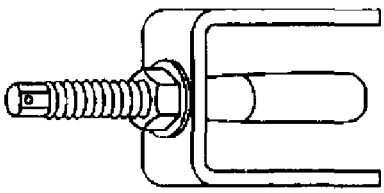
Illustration	Tool Number/Description
	J 1859-A Steering Wheel Puller
	J 21854-01 Pivot Pin Remover
	J 23653-SIR Lock Plate Compressor

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Fig. 178: Special Tools & Equipment (1 Of 3)
Courtesy of GENERAL MOTORS CORP.

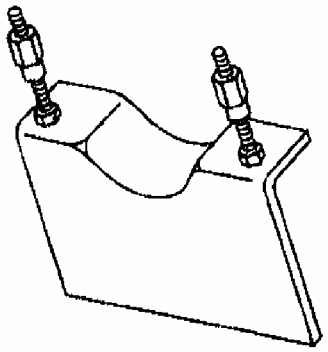
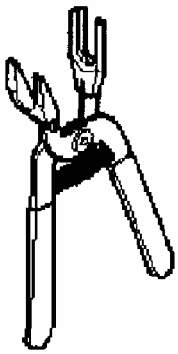
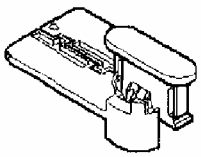
Illustration	Tool Number/Description
	J 41352 Modular Column Holding Fixture
	J 41396 Park Lock Cable Pliers
	J 41688 Tilt Centering Sphere Installer

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Fig. 179: Special Tools & Equipment (2 Of 3)
Courtesy of GENERAL MOTORS CORP.

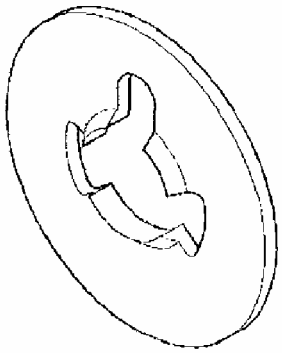
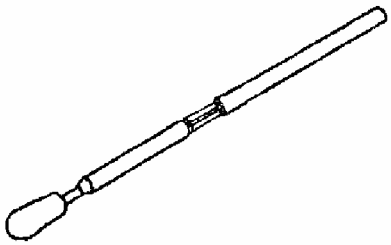
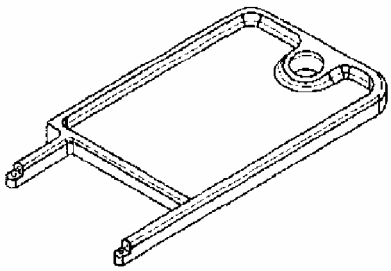
Illustration	Tool Number/Description
	J 42137 Steering Column Lock Plate Compresor Adapter
	J 42640 Steering Column Anti-Rotation Pin
	J 42759 Ignition Switch Connector Rel Tool

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Fig. 180: Special Tools & Equipment (3 Of 3)
Courtesy of GENERAL MOTORS CORP.